Electrical Contracting

APRIL

1935

NEW ESTIMATING SERIES...

STARTS IN THIS ISSUE

•

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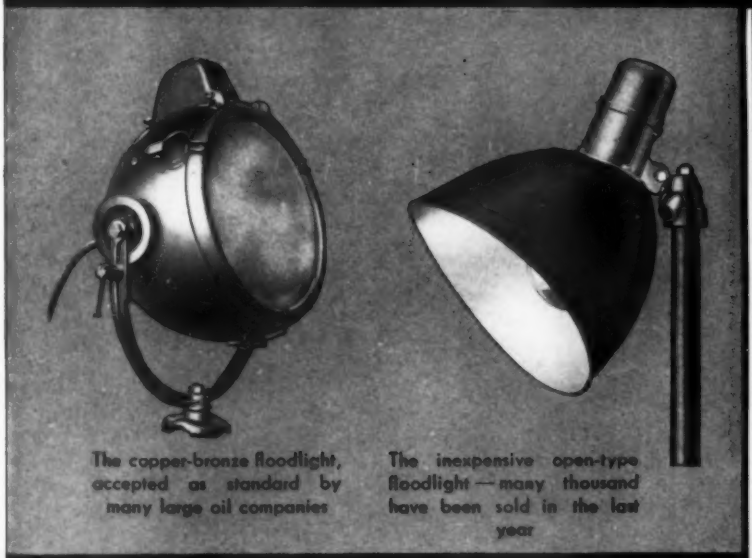
THEATRE REMODELING PROBLEMS

CELLULOID FACTORY HAZARDS

SAFE TEMPORARY WIRING

ASBESTOS WIRE APPLICATIONS

Get in on This Profitable Business



The copper-bronze floodlight, accepted as standard by many large oil companies

The inexpensive open-type floodlight — many thousand have been sold in the last year

Sell G-E Floodlights

HERE is a profit-making line of equipment that can be sold in a variety of places. Take, for example:

FILLING STATIONS—sell floodlights on the basis that they will increase both the day and the night business of a station 20 to 25 per cent. (Publications GEA-1919 and GEA-1992 give these figures and recommend equipment.)

PARKING FIELDS—an argument for such operators is that floodlights will make their fields more attractive, increase their business, make their work easier, and assure their customers greater protection.

SOFT-BALL FIELDS—Soft ball will be even more popular this summer. It is a night sport that depends on good lighting for its success. Floodlighting is the most efficient and most satisfactory method of lighting all sports.

Among General Electric floodlights, the long-lived, inexpensive, open-type AL-45 (for wattages up to 1500) and the high-grade, copper-bronze, enclosed AL-31 (for 1000-watt lamps) are very popular for these applications.

Let us help you get this lighting business. Our floodlighting catalog, GEA-1865, may be useful—write General Electric, Dept. 6F-201, Schenectady, N. Y., or the nearest G-E office, or G.E. Supply Corporation.

INSTALL G-E TIME SWITCHES

G-E time switches will be profitable. You will have no expensive service calls to wind clocks, set time, lubricate bearings, and free sticky contacts. Installed as a part of any wiring job, they often bring repeat orders and new business because of their reliability. These switches stay sold and keep selling for you.

INSTALL G-E CABLE

With floodlights, transformers, and many other equipments, the sale of G-E cable will make profits for you and will assure your customers a permanent installation. You can get G-E insulated cable in every type, size, and voltage. Illustrated are three types for burying directly in the ground.

500-131

GENERAL ELECTRIC

VOLUME 34
NUMBER 6

electrical contracting

WITH WHICH IS CONSOLIDATED THE ELECTRAGIST and ELECTRICAL RECORD

S. B. WILLIAMS, Editor F. J. SEILER, Assistant Editor
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SAFECOTE WIRE PERFORMANCE depends upon its *Insulation*

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1935

marks the 25th anniversary of the U. S. Rubber plantations in the Far East. The 1934 crude rubber production of U. S. was more than three times the combined output of all other American rubber companies.

Wire performance depends upon insulation — insulation depends upon rubber. As a product of the largest producer of rubber, U. S. Safecote is your assurance of the ultimate in wire performance. All sizes. A variety of colors for circuit identification.

Stocks In All Industrial Centers

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from the actual planting of the rubber trees, its grafting, tapping down through the various manufacturing operations to the finished product, assures extra value and extra performance for the user.

U.S. SAFECOTE WIRE

An Outstanding Value of the United States Rubber Company

1.8%

OUT of every 1,000 jobs generated by the Better Housing Campaign, according to a statement from the Federal Housing Administration, only eighteen originate as electrical work.

The situation, of course, is not as bad as the above figures would suggest, because in a large percentage of modernization jobs that originate with other branches of the building industry, a certain amount of electrical work is necessary.

Should we, however, be content with the electrical work that comes in conjunction with some other work?

THERE are certain kinds of modernization work that almost sell themselves, such as painting, a new roof, etc., where it is obvious that something must be done. There is nothing obvious in the same way to the lay mind about the electrical installation.

There are certain kinds of modernization that home owners have wanted and longed for—things that were almost necessities such as an extra bedroom, or another bath. The public feels no such necessity with respect to electric wiring.

There are certain kinds of modernization that house owners have wished for because of added comfort such as automatic heat or a recreation room. Certain kinds of electrical appliances do come in this category, but, as is apparent from the figures quoted above, not in very large number.

Are we not faced then with one of two situations: Either little or no need for electrical modernization exists, or the public has not been sold?

On the score of need we should be pretty well convinced. Survey after survey has shown the lack of anything approaching adequate wiring. We know how little has been done to improve installations made twenty years or more ago. We know how much bootlegging has increased the amount of defective wiring. We know, in other words, that there is a very definite need for electrical modernization of homes.

It is obvious then that the public does not appreciate this need. It is equally as obvious that so long as the public remains ignorant on this point the electrical industry must remain satisfied with the crumbs that fall from this modernization feast.

THE job resolves itself in one of selling both the public and the industry. There is almost as much apathy on this score within the industry as without.

Moreover, this is a job for the entire industry to shoulder. Modernization must be sold nationally and locally, and the cost must be born by those who will profit.

The obvious ones to profit are the contractor, wholesaler and supply manufacturer, but the mere fact that a home owner will modernize his electrical work means that he wants to enjoy more electrical service. In other words, the power companies stand to increase their load. In that event, the manufacturers that depend on power company expansion will profit by modernization because added load hastens the time for purchase of more generating and distribution equipment.

Modernization of homes, in other words, is not merely the contractor's problem. It belongs to the entire electrical industry.

Let's organize the industry to sell and the public to buy.

HUNDREDS of thousands of dollars worth of Lighting business has been built by the "Better Light—better Sight" campaigns.

Constant educational publicity from many sources is awakening business and industry to the dollar-and-cents value of better lighting. Better lighting becomes easier to sell.

A huge market is growing up—right in your own vicinity as a result of these activities. Why not take advantage of it? Aggressive selling and active solicitation of lighting business will bring real results.

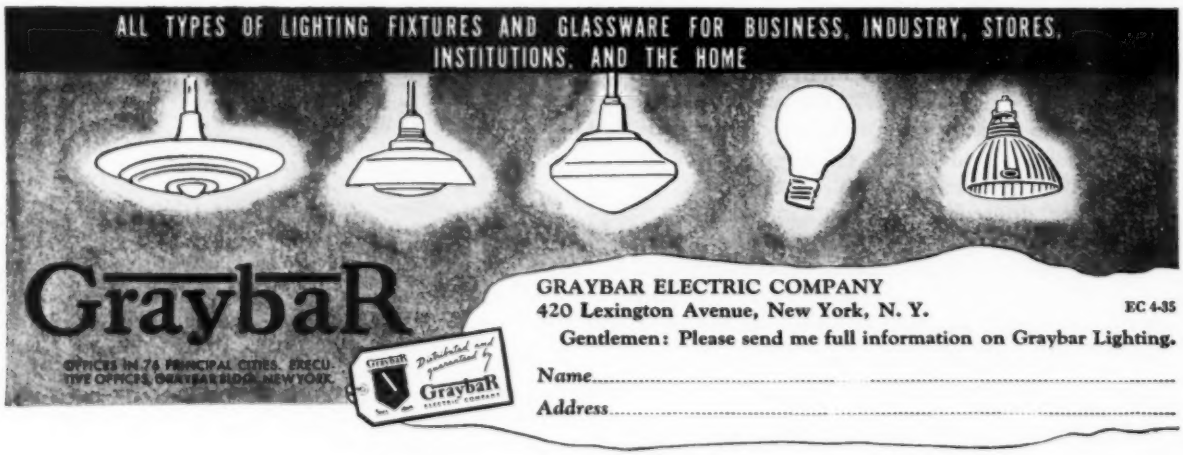
New selling weapons are available. Light meters give prospects a practical picture of their Lighting. Beautiful new fixtures, moderately priced, melt sales resistance. Modern ideas of glare-prevention, adequacy of lighting, etc., are finding acceptance. Graybar has assembled the most complete line of lighting fixtures and glassware available anywhere. There are fixtures to meet every purse and purpose.

The way has been paved. But the profits go the man who does the *selling!* What about it, Electrical Contractors?

Graybar offers definite assistance. First in the form of expert advice—advice based on a thorough experience in lighting any and every kind of building. Second, in providing a complete line of quality fixtures and glassware for industry, offices, stores, institutions, and the home . . . This includes lamps. Graybar is a distributor nationally of G.E. Mazda lamps.

Finally, Graybar has always supported the cause of Better Lighting. Behind the Contractor's individual selling stands Graybar's unceasing publicity and promotional activities.

For full information on Graybar's complete, up-to-date Lighting lines, see coupon below. Mail it *today!*



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WITH WHICH IS CONSOLIDATED THE ELECTRAGIST AND ELECTRICAL RECORD

CORMORANTS

I've met a world of fishermen in my time, but the smartest anglers I know of do their stuff in Oriental waters. It seems the Japanese have always been fond of the fishing business and thousands of them make a living at it, but they grew tired of the hard work necessary in building up a large volume.

The class I speak of took no stock in that old saying: "Everything comes to him who waits." To them it is just an excuse for sitting on a wet pier and making a few cents a day, maybe. Nor did they like pulling up heavy nets, which gives a man high blood-pressure.

So they looked around for a nice, industrious helper to do the work—one who would hit the ball 14 hours a day and not squawk about overtime or small compensation. Finally, some bright lad made the grade, and the answer was Cormorants. Now, the cormorant is a bird —sort of a cross between a woodpecker and a penguin, ugly as sin, but oh, what a fisherman! He'll get out of bed in a rainstorm, with pneumonia, to go fishing.

The Japs tie a 30 ft. cord to the neck of a cormorant and heave him overboard. When he catches his fish, the string around his throat prevents him from swallowing, so all they have to do is haul him into the boat, squeeze his gullet, and plop! there's a meal for somebody. Then they throw him in again and again till sundown, but he takes more encores than a tapdancer without complaining. I guess he can't quit hoping the string will break. And all he gets out of it is a few of the insides at the end of the day.

The electrical contractor has been doing a swell job of fishing ever since the industry was born. True, he has always had his percentage, but, in the case of most of the materials he uses in his business, that old string around his neck has kept that percentage right on a par with the poor cormorant's cut—just enough to give him strength to keep on fishing. He gets the lion's share of the work but only the tail-end of the total profit.

Unlike the cormorant, who never knows what it's all about, the contractor has rebelled, more or less intelligently, against the slim proportions of his spread. Some progress has been made, as in the case of some of his customers, who now have to pay more than he does. But, in general, his discounts are definitely inadequate; immediate additional concessions are vitally necessary to insure his financial success.

Confucius rang the bell when he said: *"The well-fed ox always ploughs the deepest furrow."*

by
JOHN
WISE

Labor Costs for Show Window Lighting

By RAY ASHLEY

New Estimating Series

BECAUSE no two wiring jobs are alike, electrical estimating involves the application of average cost figures to varying conditions. Assuming that the basic cost figures are reasonably accurate, the correctness of the estimate becomes a matter of the extent to which the variables, *i.e.*, the way in which each job and the condition surrounding it depart from average, are considered.

We have, therefore, arranged with Ray Ashley of Chicago, one of the leading authorities on electrical estimating, to prepare a series of estimating articles on different types of installation, showing how to evaluate their variables.

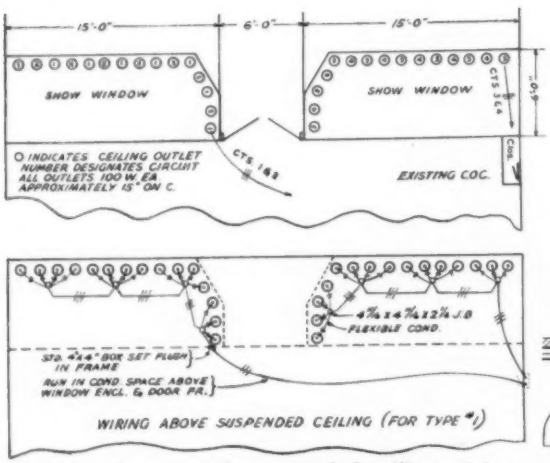
Mr. Ashley will work not only from his own data, but where other authentic data is available, such as the Electragist Manual of Estimating, it too will be consulted. In addition, our readers will be asked to assist by furnishing data.

It must be borne in mind, however, that while the data will represent the best average available, the primary purpose is not so much to give labor data, as it is to show the relative costs of variables. Readers, therefore, are reminded that for the best results they should work from their own average cost data, making allowance for the variables, as shown in these figures.—*EDITOR.*

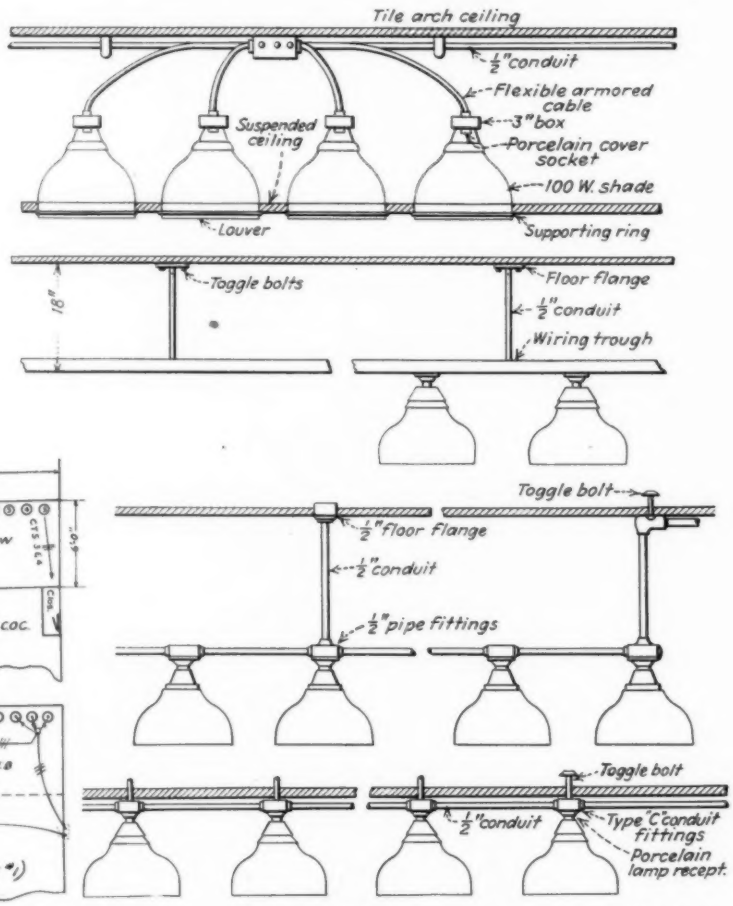
MUCH of the present commercial remodeling work is in the installation of new store fronts and windows which, of course, involves new show window lighting. This first article, therefore, in our new series on estimating will take up the cost variables that might be encountered in the complete revision of a store front.

The circuits are to be connected to an existing panel near the windows, as noted in the window layout. A conduit raceway is provided above the bulkhead enclosure and door frame, for the circuits run to the window farthest from the panel.

This same window, with the same



Window layout with suspended ceiling wiring



Hanging methods for Tables 1, 2, 4 and 5, respectively

number of 100-watt outlets will be considered under six different conditions, the difference being in the equipment used, and the manner of installing the same.

1. Flush Mounting Reflectors with All Wiring in the Space Above a Suspended Ceiling:—The installation covered by this method, consists of installing junction boxes above the suspended ceiling and extending armored cable from them to the location of the lighting units. This cable is left long enough to extend below the opening provided for the lighting reflector. After the ceiling is installed, outlet boxes with lamp receptacles are connected to the loose ends of the cables. The shade is then fastened to the lamp receptacle, and held in its proper position by means of a mounting ring which is fastened to the under side of the suspended ceiling. It is only necessary to use louvers where the ceiling is too low to permit a deep valance, or for corner and island windows.

The number of flexible connections to be taken from a junction box depends on the spacing of the units. In some cases conditions make it advisable to install one junction box for each outlet. In a layout such as we have here, there is little gained by installing one box for four outlets over an installation with one box for each two outlets. In the latter method, the labor saved in poling up, and the decreased amount of armored cable, offset some of the saving effected by having fewer junction boxes.

Wire troughing is used in place of junction boxes for some jobs. It serves also as a raceway for the circuit wires. The troughing is run parallel to the line of fixtures and opposite each fixture a flexible cable connection is made.

2. and 3. Wiring Trough, with Lamp Receptacles Attached, (a) Suspended, (b) Fastened Directly to Ceiling:—The cost of installing wiring trough depends somewhat on the make of equipment and how well it is installed. The units submitted are supposed to represent a good installation of high grade equipment. In establishing permanent estimating tables, we would suggest having the same units for both 2 and 3 for the materials common to both methods, and have the units on the hanger equipment for 3 high enough to com-

1.—FLUSH MOUNTING REFLECTORS IN SUSPENDED CEILING

Materials	Quantity	Labor (Man Hours) Units Hrs.	Min.	Extension Hrs.	Min.
3 in. Round Boxes	30		8	4	
Porcelain Recept. (lamp)	30		8.5	4	15
100-W. Window Ref. and Holder	30		9	4	30
Mounting Rings (Flush)	30		7	3	30
Louvers	30		6	3	00
Junction Boxes (5″x5″x2½″)	8		30	4	00
Junction Boxes, 4″x4″x1⅝″	1		24		24
One Gang Switch Cover	1		8		8
Blank Switch Plate	1		6		6
Covers for Junction Boxes	8		6		48
½ in. Conduit	90 ft.		3.5	5	15
Armored Cable, 2-W.Fl.P	95 ft.		2.5	3	57.5
Armored Cable, Box Conn	60		5	5	00
No. 14 R. C. wire	320 ft.		0.5	2	40
Toggle Bolts 3″x⅜″	25		7.5	3	7.5
Connecting to C.O.C. Circuits	4		35	2	20
Miscellaneous Labor		1	29	1	29
TOTAL				48	30

Note—Small items of miscellaneous material not listed.
[1]Not always required.
[2]Unit to cover setting box, cutting and threading conduit and splices.
[3]Layout labor included.

2.—WIRING TROUGH SUSPENDED FROM CEILING

3.—MOUNTED ON THE CEILING

Materials	Quantity	Labor (Man Hours) Units Hrs.	Min.	Extension Hrs.	Min.	Labor (Man Hours) Units Hrs.	Min.	Extension Hrs.	Min.
Wiring Trough (Window)	42 ft.	6.5		4	33	6		4	12
Angle Turns (Trough)[1]	4	32.5		2	10	15		1	
End Caps (Trough)	4	12			48	6			24
Capping (Trough)	38 ft.	2.5		1	35	2.5		1	35
Mounting Shops (Trough)	16	....	..	....		3.5			56
Couplings (Trough)	4	10.5			42	7			28
Porcelain Receptacles (Lamp)	30	8.5		4	15	9.5		4	45
100-W. Window Reflectors and Shade H	30	9		4	30	7.5		3	45
½ in. Floor Flange (Hanger)	12	18		3	36	....	..	....	
½ in. Conduit	50 ft.	....	..	....		....	..	....	
½ in. Conduit[2]	70 ft.	3.5		4	5	3.5		4	2.5
Armored Cable, 2 W	6 ft.	2.5			15	....	..	....	
Armored Cable, Box Conn	4	7			28	....	..	....	
No. 14 Asbestos Wire, in trough	150 ft.	0.7		1	45	....	..	....	
No. 14 R.C. Wire, in conduit	180 ft.	....	..	....		0.7		1	45
No. 14 R.C. Wire, in conduit	190 ft.	0.55		1	44.5	0.6		1	48
Junction Boxes, 4″x4″x1⅝″	3	22		1	6	33		1	39
One Gang Switch Cover	1	3.5			3.5	7			7
4″x4″ Box Covers	2	3.5			7	5.5			11
Blank Switch Plate	1	3.5			3.5	5.5			5.5
Connect to C.O.C. Circuits	4	29		1	56	29		1	56
Toggle Bolts[3]	46	8		6	8	8		5	52
Miscellaneous Labor	44	1	17	1	17	1	16	1	16
TOTALS				41	6.5			39	49.5

1. Adjustable elbows
2. 20′ Conduit used for hangers
3. Layout labor included.

4.—CONDUIT FITTINGS SUSPENDED FROM THE CEILING

Materials	Quantity	Threaded Fittings Labor (Man Hours) Units		Threaded Fittings Labor (Man Hours) Extension		Threadless Fittings Labor (Man Hours) Units		Threadless Fittings Labor (Man Hours) Extension	
		Hrs.	Min.	Hrs.	Min.	Hrs.	Min.	Hrs.	Min.
½ in. "C" Fittings	16		17	4	32		11.5	3	4
½ in. "TB" Fittings	10		19	3	10		15	2	30
½ in. "LB" Fittings	4		18	1	12		13		52
½ in. "LR" Fittings	1		19		19		14		14
½ in. "LL" Fittings	2		19		38		14		28
½ in. Blank Covers	3		8.5		25.5				25.5
Porcelain Recept. (Lamp)	30		9.5	4	45			4	45
100 W. Reflectors and S. H.	30		8.5	4	15			4	15
½ in. Conduit	120 ft.		4	8	00			8	00
No. 14 Asbestos Wire	150 ft.		0.75	1	52.5	Same		1	52.5
No. 14 R. C. Wire	190 ft.		0.6	1	54	as		1	54
½ in. Floor Flanges	10		11.5	1	55	"A"		1	55
4"x4"x1⅝" Box, J. B.	1		33.5		33.5				33.5
One Gang Switch Cover	1		3.5		3.5				3.5
Blank Switch Plate	1		11		11				11
Toggle Bolts	50		7	5	50			5	50
Connect to C.O.C. Circuits	4		33	2	12			2	12
Miscellaneous Labor		1	36.5	1	36.5			1	36.5
TOTALS				43	24.5			40	41.5

5.—CONDUIT FITTINGS FASTENED TO THE CEILING

Materials	Quantity	Threaded Fittings Labor (Man Hours) Units		Threaded Fittings Labor (Man Hours) Extension		Threadless Fittings Labor (Man Hours) Units		Threadless Fittings Labor (Man Hours) Extension	
		Hrs.	Min.	Hrs.	Min.	Hrs.	Min.	Hrs.	Min.
½ in. "C" Fittings	30		16	8			11	5	30
½ in. "L" Fittings	2		26		52		15		30
½ in. Covers for Fittings	2		10		20				20
Porcelain Receptacle (Lamp)	30		10	5	00			5	00
100 W. Window Reflectors	30		8	4	00			4	00
½ in. Conduit	100 ft.		4	6	40			6	40
No. 14 Asbestos Wire	150 ft.		0.7	1	45			1	45
No. 14 R. C. Wire	180 ft.		0.6	1	48	Same		1	48
Junction Box, 4"x4"x1⅝"	1		24		24	as			24
One Gang Switch Cover	1		5.5		5.5	"A"			5.5
Blank Switch Plate	1		5.5		5.5				5.5
Toggle Bolts	50		8	6	40			6	40
Connect to C.O.C. Circuits	4		35	2	20			2	20
Miscellaneous Labor		1	23	1	23			1	23
TOTALS				39	23			36	31

6.—OUTLET BOXES MOUNTED ON THE CEILING

Materials	Quantity	Labor (Man Hours) Units		Labor (Man Hours) Extension	
		Hrs.	Min.	Hrs.	Min.
4 in. Oct. Boxes	30		11.5	5	45
Porcelain Receptacles (Lamp)	30		8.5	4	15
100 W. Window Reflectors and Holder	30		9	4	30
½ in. Conduit	100 ft.		3.5	5	50
No. 14 Asbestos Wire	150 ft.		0.7	1	45
No. 14 R. C. Wire	180 ft.		0.65	1	57
4"x4" box (J. B.)	1		33.5		33.5
One Gang Switch Cover	1		5.5		5.5
Blank Switch Plate	1		5.5		5.5
Toggle Bolts	50		9	7	30
Connect to C.O.C. Circuits	4		33	2	12
½ in. L. & B.	60		0.1		6
Miscellaneous Labor		1	23	1	23
TOTAL				35	57.5

pensate for the difference in the two installation costs. It is true that the units will not represent an accurate distribution of costs, but if one has too many units for the same equipment, his tables become so involved that he may get confused.

4. and 5. Conduit Fittings, Both Threaded and Threadless, (a) Suspened From Ceiling, (b) Fastened Directly to Ceiling:—The use of conduit fittings has been in common practice for a long time, in places where it was desired to drop the lighting units down from the ceiling. There is hardly any form of window wiring which requires quite the care for getting outlets lined up, as this. Irregularities in the ceiling height must be compensated for in the length of hangers, fittings must be selected carefully so that the threads will permit perfect alignment, and hangers must be securely fastened to prevent the entire installation from getting shifted out of position.

6. Standard 4-in. Octagonal Boxes Fastened Directly to Ceiling:—The decrease in time required for installing ordinary 4-in. boxes, under that required for fittings is not as great as one might expect. This is due to the fact that the fittings and conduit can be largely assembled on the floor. Some contractors maintain that they can put in an installation faster with fittings.

Conclusion

It will be noted that the units for the same materials are not identical in all tables. This is because these tables are made up from job costs and do not maintain the same regularity as estimating tables.

H.O.L.C. ISSUES MASTER MODERNIZATION SPECIFICATIONS

The Home Owners' Loan Corporation has issued a 32-page compilation of "master specifications" for its home-reconditioning work. The requirements are designed to safeguard the home owner against questionable workmanship and materials by guiding contractors in the reconditioning of homes which are security for loans granted by the corporation.

While eliminating sub-standard products, the specifications permit the widest choice of materials so long as they are used properly and are suitable for the job.

Cuts Motor Repair Test Cost

Switchboard reduces set-up time for testing small a.c. motors to attachment of three test leads

THE proper testing of reconditioned electrical equipment in the repair shop is just as important as the manufacturer's original equipment test, except that the testing requirements are somewhat different. Repair shop testing is not necessarily as detailed or refined as factory testing and seldom has the advantage of mass production costs. Almost every motor repair job is different, therefore the instrument set up and voltage requirements must be continually changed. On large machines, the cost of this test set up is easily absorbed, but on small motors, especially fractionals, it is an appreciable percentage of the total cost.

The testing of small a.c. motors with the usual set up of indicating instruments and instrument transformers involves an appreciable amount of time for changing instruments and connections for different motor ratings. Keen competitive conditions demand that costs be reduced at every possible point to insure profits on rewinding jobs. To meet this condition a switchboard was designed by the Boustead Electric & Manufacturing Co., Minneapolis, Minn. for testing fractional to 15 h.p. motors, which reduced the set up time to the attachment of the two or three test leads by means of quick acting clamp terminals. The principal time saving feature of this board is in the scheme for providing the desired instrument voltages and currents without a series of potential and current transformers and accompanying switches.

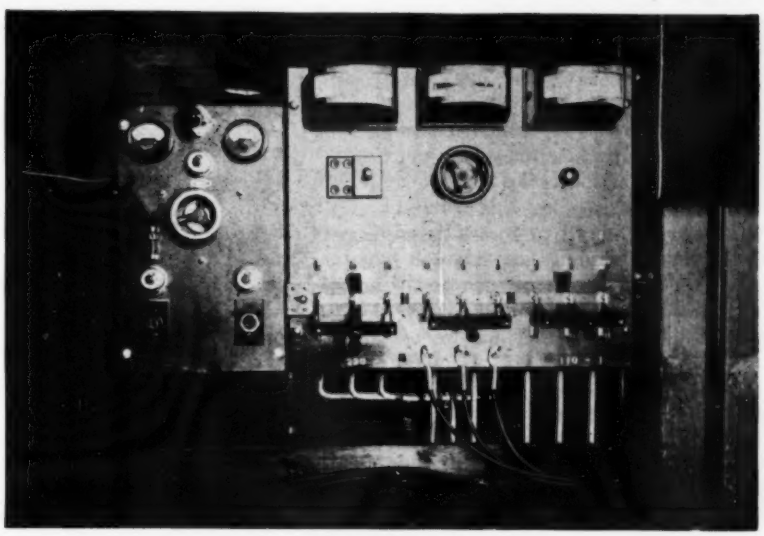
Switchboard Design

Since extreme accuracy is not so important in repair tests, it is only necessary to determine if such characteristics as exciting current, locked current, torque, etc. come within commercial limits. The allowable variation in accuracy simplified the equipment needed for obtaining a variety of voltage and current ratings.

The main supply autotransformer was also used as an instrument voltage transformer, while a step switch was made for the primaries of two multirange current transformers.

Three voltages are available at the test terminals by means of two double throw switches and main auto-

Jiffy clamp type test lead terminals

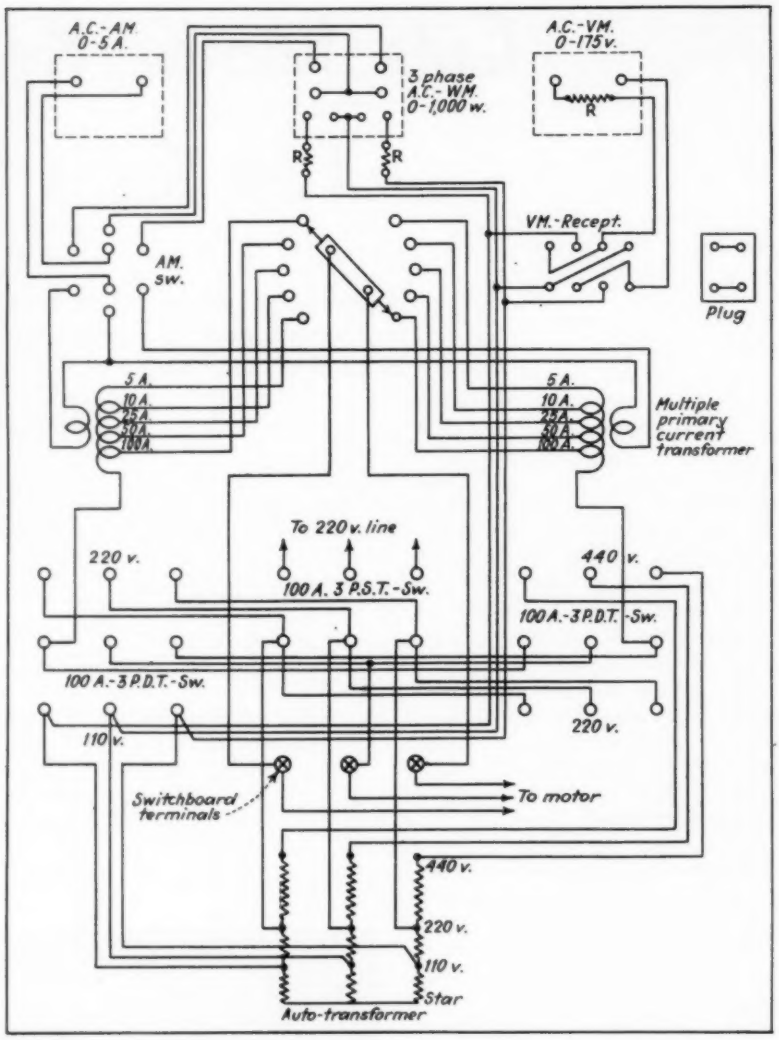


Front of Board

1—A.c. voltmeter scale and capacity 0-175 volts.
1—A.c. polyphase wattmeter. Scale 0-1000 watts. Capacity 5 amp., 150 volts.
1—A.c. ammeter. Scale and capacity 0-5 amp.
1—8 point, 3 phase voltmeter receptacle with one 4 point plug for reading voltage in all three phases.
1—Operating handle and face plate for special current transformer switch.
1—Three phase secondary ammeter switch for reading current in all three lines.
2—100 amp., 3 PDT voltage selection switches.
1—100 amp., 3 PST line switch.
1—Interlock to lock out either one of the double throw switches when the other is in use.

Rear of Board

2—Special multi-range current transformers. 5-10-25-50-100 amp. primary. 5 amp. secondary.
1—Special 100 amp., 2 pole, 5 point current transformer switch.
1—Special auto transformer 110-220-440 volts, 100 amp., 3 phase, 60 cycle.
1—Set instrument wiring and bus bar.



Rear view wiring diagram

transformer. These double throw switches are interlocked by a simple wooden slide bar with blocks, therefore, it is impossible to apply more than one voltage at a time to the test terminals. This prevents shorting the autotransformer.

The 220-volt connection is duplicated for convenience, which makes 110-220 volts available on one switch and 220-440 on the other so that a motor can be started on half voltage and quickly switched to full voltage. The 110-volt windings of the voltmeter and wattmeter are connected to the 110-volt leads of the autotransformer, which eliminates the use of a special set of 220-110 volt and 440-110 volt potential transformers, with very little error added.

The principal source of error of this board is due to the fact that the voltage connections are made ahead of the current transformer and test leads, and so the voltage applied to voltmeter and wattmeter is higher than the actual voltage at the motor due to the drop in these connections. This error has been reduced to a minimum by using extra heavy test leads and by making a special pair of multirange current transformers with more iron, fewer turns, and heavier copper than usual. For small motors, this error is negligible while on the larger motors it can be reduced by taking locked tests at half voltage and by dropping back to the larger current point on the current switch.

Special current transformers were made by knocking down four old burned out current transformers and restacking them into two cores with practically double the iron, and at the same time winding a new secondary and primary. The latter was provided with a tapering copper cross section and taps. The autotransformer was made from an old compensator core rewound with square wire with an accurate voltage ratio so it could also act as an instrument transformer.

The primary current transformer switch was made by mounting some simple offset copper straps on the base panel and fitting a pair of double strap copper sliding contacts on the end of a front-of-board operated rheostat shaft. Heavy flexible copper leads allow free rotation from point to point.

An important time saver is a set of specially designed test lead terminals. Motors come through with terminals ranging from plain wire to special binding posts. These special terminals can be clamped to any such type of construction in a jiffy by a few turns of the thumb nuts.

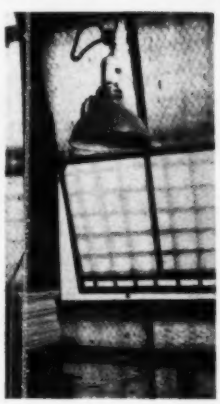
This board is claimed to be paying for its cost of construction at a rapid rate by the time saved in motor testing operations.

WIRING CONDITIONS FOUND IN FACTORIES

No. 6—Celluloid Novelty Plant

THE hazards which prevail in small specialty industries extend beyond the confines of the plant itself, since they generally occupy space in the large loft structures of our industrial cities, thereby imperiling the lives of many other workers, should a fire or explosion occur.

This celluloid novelty manufacturing plant is an example of dangerous fire and explosion hazards for which little regard was given in the wiring system, or the motor and control equipment. Heavy electric heat loads are used at scattered work benches, these being connected to excessively over-loaded lighting circuits. None of the receptacles, switches or lighting units are suitable for use in proximity to fine celluloid dust. The motors, starters and distribution equipment are even below that required for normal approved duty.



(Top) Roughing line, where high speed abrasive wheels used to grind blocks of celluloid, create a fog of highly explosive celluloid dust which settles upon various adjacent equipment, motors, lamps, etc. The lighting outlets, motors and starters are not of the explosion-proof type.

(Middle left) Control for small motor, mounted on the floor beneath an assembly bench, consists of a single-pole pony-type porcelain base switch fastened to the under side of bench. There is plenty of dust and rubbish all around.

(Middle right) This electrical celluloid molder press is less than 2 ft. from the open pilot lamp and snap switches in the background. The flexible wires at the right feed the individual heating elements.

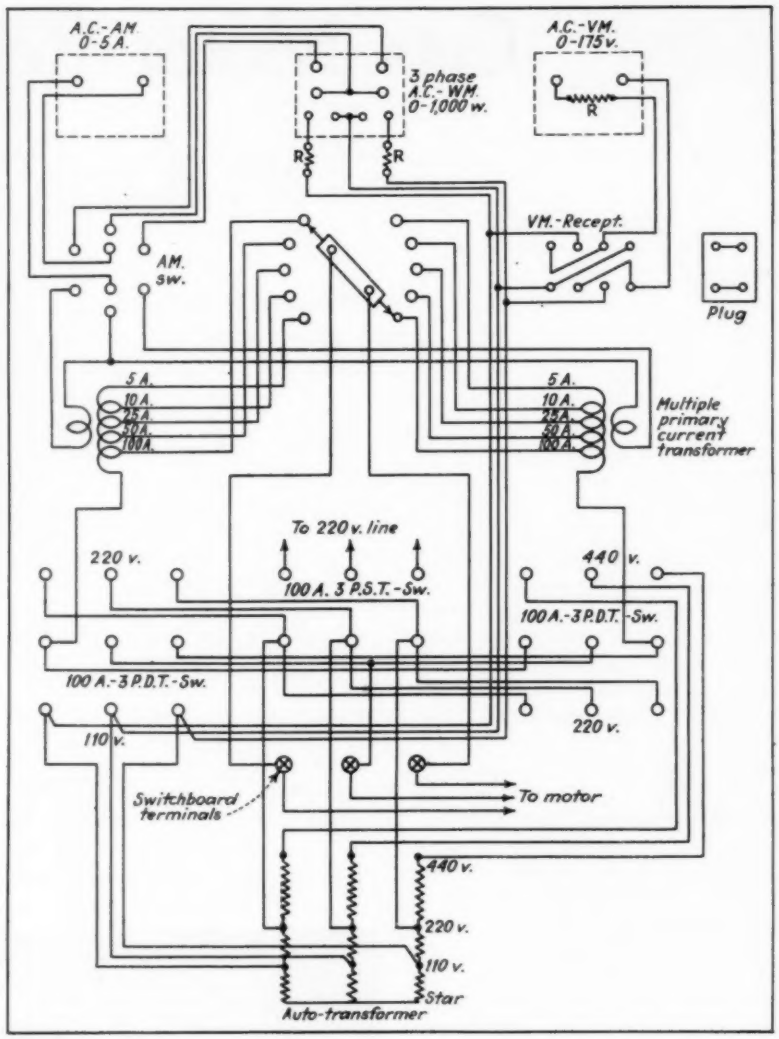
(Lower left) This electrical sheet celluloid embossing press receives its current from a lamp cord which is wrapped around a nail driven into the wood shelf directly above the through-cord switch. This switch case, if "alive," could cause a dangerous sputtering arc by becoming grounded to the metal press frame. The adjustable drop cord is equipped with an open lamp.

(Lower center) The celluloid stack at left has been rough sheared. The twisted cord which is draped behind the steel shelf of a shearing press leads to an electric hot plate on the work-bench. It is attached to the shadeholder, and the attachment plug happens to be hanging loose behind the reflector. The drop cord has become frazzled between the cord adjuster ball and the socket to almost the burn-off stage.

(Lower right) In "wiring" for a one-h.p., 3-phase, 220-volt motor there was a shortage of switches, therefore, a 110-volt porcelain-base switch equipped with plug fuses was mounted in a steel cabinet for the control device. Incidentally, the "B"-phase fuse is bridged.

Rear of Board

2—Special multi-range current transformers. 5-10-25-50-100 amp. primary. 5 amp. secondary.
1—Special 100 amp., 2 pole, 5 point current transformer switch.
1—Special auto transformer 110-220-440 volts, 100 amp., 3 phase, 60 cycle.
1—Set instrument wiring and bus bar.



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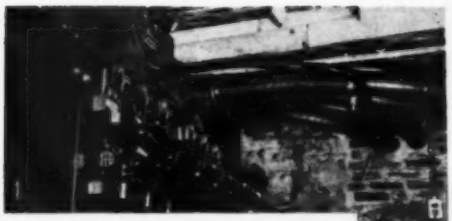
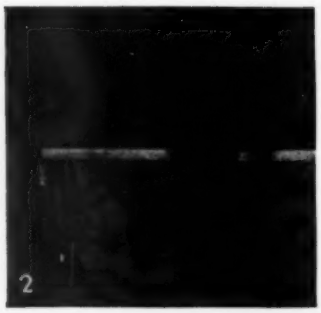
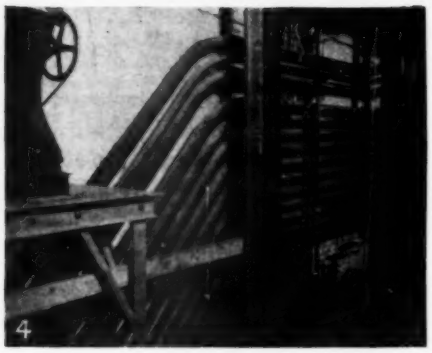
Metropolitan Rewiring a Large Conduit







1. The main switchboard for new a.c. feeders had to be designed to fit a limited space and a 78-in. ceiling height. There are eight 3½-in. conduits, each containing eight 4/0 service conductors which ell into the overhead pull box in this limited ceiling space, beyond a number of steam pipes. The pull box is recessed to provide clearance for these steam pipes.

2. In racking nine 3½-in., two 2½-in., and one 2-in. main feeder conduits, this group was kept intact until fanned out at the proper reactance groups below stage. These conduits were off-set for compact double-decking before passing through a thick masonry wall in the background to the main switchboard just beyond. A horizontal 2½-in. by 2½-in. angle iron conduit support is imbedded in the masonry of the passageway.

3. In getting down to the lower levels, the large main feeder conduits needed to follow many sharp turns so as to avoid important equipment. Angle or corner pull boxes were found helpful, both to facilitate conduit make-up and wire pulling. Here one end of a pull box is fitted behind a steam riser. Another pull box directly above is used for some of the branch circuits between the house effects and reactance banks. Staggered knockouts permitted a closely-spaced single-row wall run of feeder conduits.

4. A wall run of 3½-in. conduits in which a sweep was required to clear the blower in the left foreground, was also held out from the wall to clear a group of vertical conduits behind this racked run. Two vertical two-member channel iron supports are used on the level part of the larger conduit. The back members are anchored to the masonry wall, after ⅜-in. conduit spacer and clamping bolts were inserted from the back.

5. The main feeder conduits slope downward to the reactance backs, while border light and house circuit conduits are racked in front of them. There are six "stacks" of conduit outward from the wall, each group held in position with channel iron racks. The supporting framework comprises a series of 3 in. channels resting upon new steel beams and headers which in turn are attached to the building columns.

THE number of large conduits installed in rewiring the Metropolitan Opera House in New York City offer an example of large scale modernization operations performed under difficult installation conditions. This conduit system provides an adequate number of circuits of proper capacity for the many effects used in the Metropolitan's productions.

The principal installation difficulties encountered by the E. J. Electrical Installation Company of New York City were:

1. The routing of conduits about the existing structure with minimum cutting so as to minimize damage or weakening of walls.

2. The grouping of conduits so as to avoid interference to back-stage and below-stage rigging equipment without blocking restricted passageways.

3. The separation of runs containing wires of different systems near their respective junction boxes.

4. The arrangement of like runs of conduit so as to terminate them in orderly sequence at their destination.

5. The rearrangement of old conduit runs so as to permit the permanent installation being made.

6. The placing of junction boxes in such locations as to make them most useful for ease in cable pulling.

7. The elimination of many small conduit runs through the grouping of numerous circuits in larger conduits.

Scope of Work

A new thyratron tube remote-controlled stage switchboard was installed for controlling the lighting effects of both the house and stage. The pilot or control board is at the stage level, while the reactance dimmer frames, magazine panels, con-

Opera House Problem in Installation

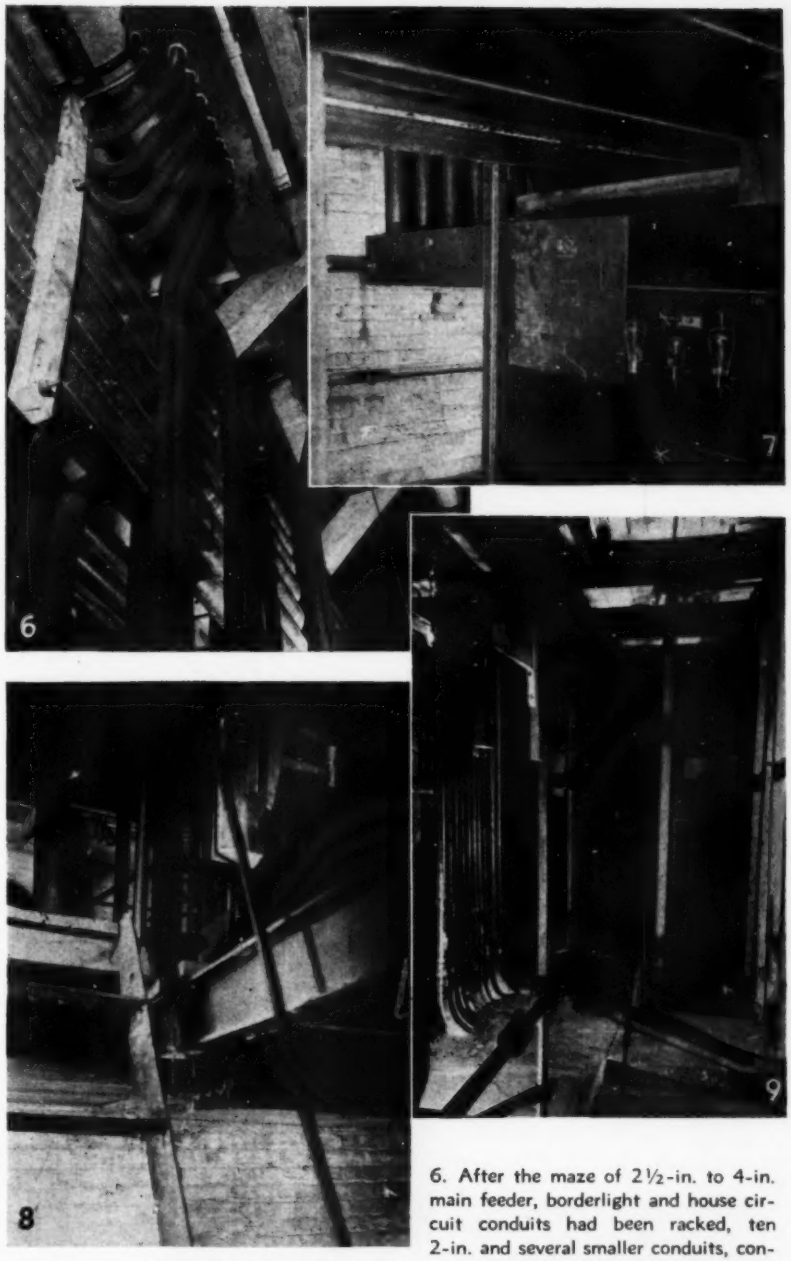
tactors and tube control panels are installed in parallel rows two levels below stage.

The new conduit system was most complicated around the reactance and magazine banks below-stage. Over 700 control wires, mostly No. 16, were installed in 2-in. conduits up to the pilot board. Nine 3½-in., two 2½-in. and one 2-in. conduit contain the main feeder cables between the service switchboards and the magazine board which supply 3-phase, 4-wire a.c. and 110/220 volts d.c. The various border light, footlight, pocket and house circuits likewise were run new from their respective magazine panels to the different outlets. The large number of such circuits employed resulted in grouping them in large conduits ranging in size from 1½ in. up to 4 in., thus reducing the space which would have been required if small branch circuit conduits had been employed.

There are three separate main service and distribution switchboard rooms, these being at the Thirty-ninth Street, Fortieth Street and Broadway sides. Each is supplied with d.c., and the Thirty-ninth Street room also contains the new 3-phase, 4-wire service for the tube-controlled, stage switchboard load. A new wiring system has been installed from each switchboard to all lights and motors served by it in that section of the building.

Reasons for Modernization

This new wiring installation replaces one which was often found lacking. Large scenes requiring heavy lighting loads could not be properly lighted without danger to an inadequate feeder system. The limited number of controls on the former obsolete stage switchboard restricted a choice



6. After the maze of 2½-in. to 4-in. main feeder, borderlight and house circuit conduits had been racked, ten 2-in. and several smaller conduits, containing over 700 stage pilot board control wires were routed downward from two junction boxes located on the ceiling directly below the pilot board. A temporary conduit clamping timber has not yet been replaced.

7. The reactance and tube control panels were arranged in rows upon the last level below stage. Two in. conduit enclosing 76 No. 16 control wires is shown coming down from the stage pilot board, and connecting horizontally to its first junction box upon the top of the tube control panel. A pull box extension to the brick wall in the background simplified the connections for four 4-in. borderlight circuit conduits. The clearance between the top of the tube control and magazine-reactance panels, and the steel framework above was less than 6 in.

8. Nine "prompt" side stage pocket conduits were installed under a walkway and into a deep junction box, the top of box being level with the floor above.

9. This important below-stage walkway could not be blocked, yet crowded rigging equipment required the stage pocket conduit riser to be located here. The junction box solved a ticklish problem, and also increased the floor space.

in color effects, while the old borderlights and their cables presented a definite limitation which could only be overcome by replacement. Reinspection which had been made by the New York Board of Fire Underwriters, pointed out the dire need for a new system and the advantages that would result in its installation. These various factors prompted complete modernization of the Metropolitan's electrical system.

CONDUIT-CONDUCTOR GROUPING SCHEDULE

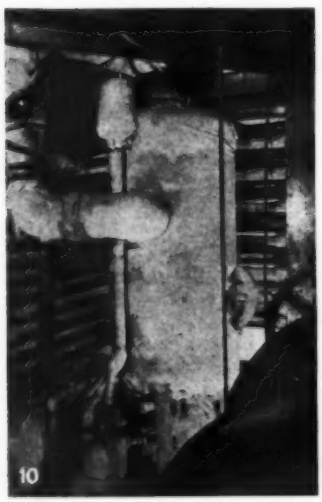
From	To	Conduits	Wires	Remarks
D. C. 40th St. Service	40th St. Sw. Bd.	2–3 in.	10–4/0	
D. C. 40th St. Sw. Bd.	Main Dist. 13 Pan.	Assorted		Power-light
D. C. Broadway Service	Broadway Sw. Bd.	1–3 in.	6–4/0	
D. C. Broadway Sw. Bd.	Main Dist. 14 Pan.	Assorted		Power-light
D. C. 39th St. Service	39th St. Sw. Bd.	1–3 in.	5–4/0	
D. C. 39th St. Sw. Bd.	Main Dist. 12 Pan.	Assorted		Power-light
A. C. 39th St. Service	39th St. Sw. Bd.	8–3½ in.	64–4/0	Stage effects
A. C. 39th St. Sw. Bd.	Reactance banks	7–3½ in.	56–4/0	Stage effects
D. C. 39th St. Sw. Bd.	Arc contactors	2–3½ in. 1–2 in.	11–4/0	Stage arc pock.
D. C. 39th St. Sw. Bd.	Reactance banks	2–2½ in.	Empty	Future
Stage Pilot Sw. Bd.	Reactor and tube controls	1–1 in. 10–2 in.	694 # 16 36 # 10	Control wires
Reactors and Magazines	House effects	3–4 in.	205 # 12 16 # 8	Ceiling domes
Reactors and Magazines	Stage pockets	2–2 in.	4–4/0	2–200 A. Arc P
		2–2½ in.	12 # 1	6–100 A. Arc P
		4–2 in.	16 # 1	8–100 A. Arc P
		8–2½ in.	256 # 10	128–50 A. Inc. P
Reactors and Magazines	Stage foots	2–2 in.	48 # 12	
Reactors and Magazines	Spec. arc	1–1½ in.	2 # 1	1–100 A. Arc P
Reactors and Magazines	Bridges	2–2 in.	64 # 10	Bridge pockets
		4–1¼ in.	16 # 6	
Reactors and Magazines	1st Fly	4–2 in.	96 # 8	Fly pockets
		4–1½ in.	24 # 6	
Reactors and Magazines	Terminal boxes at borders 1 to 8	4–4 in. 4–3½ in. 5–3 in. 1–2½ in.	76 # 6 32 # 8 852 # 10	

Conduit Installation

Most of the conduit runs were 2-in. to 4-in. sizes, thus providing sufficiently rigid spans to permit wide spacings for conduit supporting racks. Since the crowded areas required numerous turns and offsets, often involving four banks of conduits routed at various planes or angles, this wide spacing proved important in reducing the number of racks required.

Except for isolated runs of smaller conduits, the supporting methods involved steel channel frames, and horizontal supporting bars. Several large groups of conduit were run along walls which were of varying thicknesses and offsets. In such cases the cost of forming these large conduits to hug these irregular surfaces would have been prohibitive and furthermore would have made wire pulling more difficult, unless additional pull boxes were installed. Therefore, a number of additional horizontal steel beams or headers were installed between existing steel columns, upon which vertical conduit supporting steel was placed at the most desirable spacings.

A great deal of temporary wood blocking and staging timber was used in the preliminary installation of large banks of conduit. Through-bolts between opposite timbers permitted drawing groups of adjacent conduits into alignment so as to receive the permanent pieces of drilled steel channel with minimum final racking effort.



10. The below-stage portion of the borderlight, bridge and fly gallery circuit conduits had to be installed along the wall, as there was no space available overhead. Running threads were avoided in making up the conduit lengths which ran behind a large water heater, and into the riser junction box at the right. Each run was made up with a coupling butted against the box wall, and the 90-deg. ell in each run jammed tight into the corner wall at the left. After the conduit was thus put in place, a close nipple and bushing was threaded into the coupling from within the junction box.

11. This recess in the brick wall was just large enough for four 4-in., four 3½-in., and four 3-in. borderlight circuit conduits which extend upward to the gridiron space. Pipe caps with swivel eye-bolts were attached to these lengths of conduit as a means of lowering them with rope blocks into make-up position.

The practical application of
Asbestos-Insulated Wire

By FRANCIS A. WESTBROOK, M.E.

THE many economies to be derived from the proper application of heat resisting conductor insulations has brought about a wide development in various combinations of asbestos-insulated cables, wires and flexible cords. Their practical application has therefore become more generally feasible, provided the electrical contractor is familiar with the various types which are available, their uses, and some of the advantages to be derived from their proper selection.

Modern industrial or commercial wiring systems must be designed to meet severe demands, yet provide permanence, low maintenance, continuity of operation and a minimum number of failures in service. Excessive heat and certain other conditions that tend toward the rapid deterioration of rubber insulation may be successfully combatted through the intelligent use of asbestos.

The comparatively small extra initial cost of such materials, as compared with rubber covered wires or flexible cords is more than offset by their ability to withstand severe use under conditions where excessive temperatures prevail.

In case there is any misunderstanding as to the installation costs of heat-resistant wiring systems it might be well to state that present day asbestos-insulated wires may be handled just the same as any other type of wire. No special care in pulling need be given beyond that which is normally used with standard insulation, likewise no extra fittings or tools are necessary for such installations.

Furthermore, a close scrutiny of the N.E.C. current carrying capacities for conductors with asbestos insulation, as given in column C of Section 612-a will reveal some instances where smaller asbestos-insulated conductor sizes may be employed than if rubber-covered insulation (column A) were used. The conduit sizes to be employed for 600-volt asbestos insulated conductors are given in the table on the next page.

There are two general classifications of service for asbestos-insulated conductors, (a) hot, dry conditions, and (b) hot conditions where steady or intermittent moisture prevails. Either case may require flexibility. Likewise outer protective coverings may be needed to withstand severe abrasion, or to shield against severe mechanical injury, or to effectively resist injurious fumes, acids, greases, etc.

The question of when to change from rubber insulation to asbestos insulation is definitely stated under each wiring method of Article 5 of

WHERE TO USE ASBESTOS COVERED CONDUCTORS

FOR HOT DRY PLACES

Duty	Insulation Layers
Circuits run in conduit or wireways, close to furnaces, ovens, over boilers, etc. Fixture leads.	(a) Felted asbestos, (b) impregnated asbestos yarn, or impregnated cotton braid.
Flexible cords for ordinary service in hot locations.	(a) Asbestos layer, (b) asbestos braid.
Low voltage signal systems, automatic fuel burner control, thermostats, etc., in very hot locations (special 3-conductor cable).	(a) Asbestos over each conductor, (b) overall braid, (c) steel armor, to protect against abrasion or mechanical injury.
Open wiring, rheostats, control circuits, grids, and "bunch" wiring (solid or stranded wires).	1. Felted asbestos, impregnated with flameproof and heat-resisting compound, or, 2. (a) Solid layer of impregnated asbestos, with moisture-proof compound, (b) asbestos outer braid.
Open wiring requiring sharp bends, and flexibility for hinged equipment, as at switchboards or panelboards.	1. (a) Varnish Cambric, (b) asbestos, (c) flameproof cotton braid, or, 2. (a) Asbestos, (b) varnished cambric, (c) flameproof cotton braid.
Flexible leads at motors, coils, miscellaneous windings.	(a) Asbestos, (b) varnished cambric, (c) asbestos, (d) asbestos outer braid.
Motor windings.	Solid magnet wire with asbestos covering.

FOR HOT AND DAMP, OR CORROSIVE PLACES

Circuits or feeders installed in conduit or wireways, (solid or stranded) close to furnaces, ovens, over boilers, etc.	(a) Felted asbestos, having a layer of varnished cambric interposed, (b) outside braid of impregnated asbestos yarn or cotton braid.
Enclosed wiring in hot places where condensation traps or water pockets are formed, or where there are fumes which destroy rubber insulation. For temperatures up to 250 deg. F.	(a) A layer of asbestos, (b) lead sheath substituted for asbestos braid.
Flexible cords for severe service likely to be dragged over wet floors, around acids and hot equipment.	(a) Asbestos over each conductor, (b) layer of varnished cambric, (c) asbestos, (d) asbestos braid over both conductors.
Multiple conductor control cables in boiler rooms, kiln rooms, etc. Resists high temperatures, oil and corrosive fumes.	(a) Asbestos over each conductor, (b) varnished cambric, (c) asbestos, (d) color-corded cotton braid, (e) moisture proof tape around all conductors, (f) outside asbestos braid.

the Code, as for instance section 503-1.

Refinements in various conductor assemblies have eliminated powdering, flaking or falling out of the insulating wall. Sharp bends may be made without cracking, furthermore there is no hardening of the assembly, thus the modern asbestos-insulated conductor remains flexible during its entire life

Many combinations or applications of layers have been developed, some employing interposed layers of varnished cambric, outer lead sheaths, metallic armor, and such types of outer braids as will best meet the particular service conditions. Insulation application technique permits the use of stranded conductors as successfully as solid wire, particularly for flexible leads, fixture wires, and portable cords for use in hot locations, whether dry or damp. Asbestos-insulated single conductors may be had in sizes up to 2,000,000 C.M. and for 7,500 volts.

In addition to standard heat-resistant conductors for conduit installation, for fixtures and for portables, they may be widely used in hot places, such as on switchboards, instrument wiring, control circuits, grids, floodlight leads, blue printing machines, pyrometer leads, etc. Important low voltage circuits and multi-conductor control cable assemblies are available. Flexible leads for heating devices, motor leads, coil connections, etc., do not harden and resist moisture.

CONDUIT SIZES FOR 600-VOLT WIRES WITH ASBESTOS AND VARNISHED CAMBRIC INSULATION

Size Wire	O. D. in Inches	NUMBER OF WIRES								
		1	2	3	4	5	6	7	8	9
		MINIMUM SIZE OF CONDUIT								
14	.273	½	¾	¾	1	1	1¼	1¼	1¼	1½
12	.292	½	¾	1	1	1¼	1¼	1¼	1½	1½
10	.316	½	¾	1	1	1¼	1¼	1½	1½	1½
8	.345	¾	1	1	1¼	1¼	1½	1½	2	2
6	.385	¾	1	1¼	1¼	1½	1½	2	2	2
5	.409	¾	1	1¼	1½	1½	2	2	2	2
4	.434	¾	1	1¼	1½	2	2	2	2	2½
3	.460	¾	1¼	1¼	1½	2	2	2	2½	2½
2	.495	1	1¼	1½	2	2	2	2½	2½	2½
1	.562	1	1¼	2	2	2	2½	2½	2½	3
0	.604	1	1½	2	2	2½	2½	3	3	3
00	.650	1¼	1½	2	2½	2½	2½	3	3	3½
000	.700	1¼	2	2	2½	2½	3	3	3½	3½
0000	.760	1¼	2	2½	2½	3	3	3½	3½	4
250,000	.865	1½	2	2½	3	3½	3½	4	4	4½
300,000	.920	1½	2½	3	3	3½	4	4	4½	4½
350,000	.971	2	2½	3	3½	3½	4	4½	4½	5
400,000	1.019	2	2½	3	3½	4	4	4½	5	5
450,000	1.063	2	2½	3	3½	4	4½	5	5	
500,000	1.105	2	2½	3½	3½	4	4½	5	5	
600,000	1.182	2	3	3½	4	4½	5	5		
700,000	1.254	2	3	3½	4	4½	5			
750,000	1.288	2½	3	4	4½	5	5			
800,000	1.321	2½	3	4	4½	5				
900,000	1.383	2½	3½	4	4½	5				
1,000,000	1.442	2½	3½	4	5					

Safe Usable Temporary Wiring

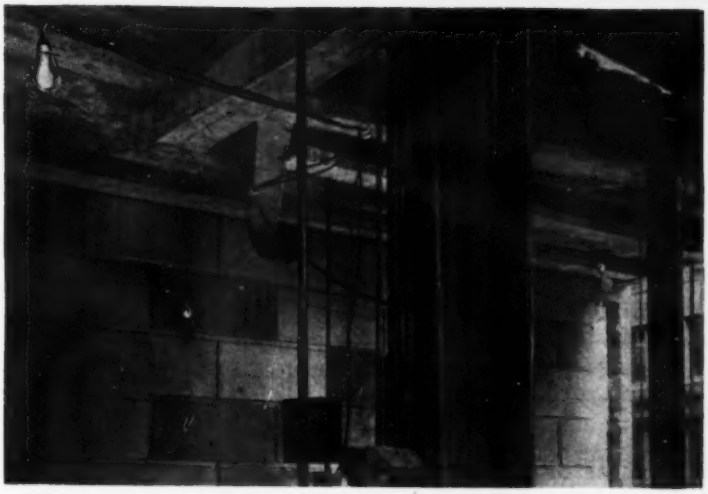
SPEEDY construction schedules require adequate provisions for temporary light and power. Such systems need to be protected against mechanical injury which could seriously delay operations. Outlets must be provided for maximum convenience, yet the wiring must be flexible, while being kept free of abrasion, expensive grounds, or possible shock hazards. Definite circuits must be provided for all areas, so as to avoid a cumbersome and overloaded entanglement of complicated tap-offs to all directions.

The larger jobs usually anticipate heavy temporary loads. However, the smaller jobs, such as additions to existing buildings, where one or more sides are shut off from daylight, are often more in need of good temporary wiring.

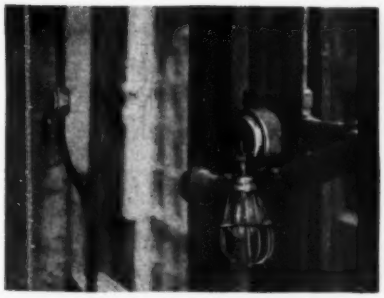
Some of the methods employed in providing temporary wiring for an addition to a New York building are pointed out in the accompanying photographs.

Because service or feeder interruptions can prove to be quite expensive the mains and principal feeders are enclosed in rigid conduit rigidly suspended close to the ceiling. A code gauge steel cabinet with locked doors encloses the main distribution panel.

Each two floors are served from one locked fuse cabinet, which is connected to a common lighting feeder run in rigid conduit. This conduit is finally abandoned within the finished walls. The temporary siren is supplied from a special feeder which connects to the upper fuse cabinet. Porcelain tree insulators accommodate four and five duplex conductors, which are brought up to the ceiling through porcelain bushings in the bottoms of cabinets.



A minimum amount of "cobwebby" temporary wiring results from keeping the duplex streamer circuits grouped together above the panel until they are taken to the logical point for fanning them out.



Fire hose connection areas are lighted at each floor and are connected on separate conduit-protected riser circuits. Stairs are likewise lighted throughout with independent circuits. This conduit is also abandoned when the job is done.

No current carrying conductors need to come in contact with steel or concrete, nor carry excessive span stresses. Here three duplex circuits are brought from the cabinet at the left to a three-way spread insulator, which is suspended by iron wire from the ceiling form.

Guarded lamps and spare portable device sockets are suspended at just the right places by wrapping iron tie wires around the outer groove of the tree insulators and fastening this wire to the steel or concrete.

The sockets at the ends of streamers are just as easily placed where wanted, since the insulators may be guyed from the desired angles. Usually two iron wire guys place the drop cord or electric drill socket above a saw or make-up bench.

electrical contracting

With which is consolidated Electrical Record

S. B. WILLIAMS, Editor

BARE NEUTRAL

AT THE Code revision meeting of the Electrical Committee, N.F.P.A., last month bare neutral both won and lost. In other words, after being denied a place for general application, it was finally accepted for range wiring only, provided it was within an assembly. Just how far this will reduce costs is problematical. It obviously, however, will alter range wiring practices.

The one disturbing element in the whole discussion is the threat of the water works interests to deny to the electrical industry the right of grounding on the water pipe. This is really serious.

If the water pipe ground is not available, and it will be difficult to deny the right of the water supply people to so protect their rights, then we are faced with the necessity of providing some other equally satisfactory ground, or of going to a thoroughly insulated system of wiring. Since the artificially driven ground is not generally satisfactory, are the power companies ready to supply a common customer ground?

Are we to scrap accepted and proven wiring methods because of this grounding situation, brought about by the bare neutral discussion, especially when the savings that might accrue are of doubtful nature?

The Electrical Committee, after voting down the proposal to permit the use of bare neutral for range and water heater wiring, then voted to permit its use for range wiring only. This, of course, was a gesture, because water heater wiring is not generally adapted to bare neutral. It is, of course, a nice thing to see friendly gestures, but we sometimes question their wisdom, particularly if it is a matter of choosing between good and bad wiring.

If the water works people should start to remove grounds from water pipes, we might easily find ourselves in the position of having to admit that "the operation was a success, but the patient died."

CODE REVISION

THE National Electrical Code will be rewritten, for the 1937 edition, but not in the manner suggested by the light and power group. The Electrical Committee, N.F.P.A., accepted the report of the sub-committee, headed by Dr. Lloyd of the Bureau of Standards, and voted to hold a meeting a year hence for the sole purpose of considering a sample revision which is to be the basis for a general code revision.

The committee was in accord with the idea that the Code should be rewritten from the standpoint of clarity and of rejecting manufacturing standards for factory built products. On the other hand, the committee insisted that detail was essential in order to secure uniformity of understanding.

In a sense the light and power industry is deserving of a vote of thanks for bringing this issue to a head. In the first place, an editorial revision is to be made in an orderly fashion. This has been needed for some time. Secondly, by bringing up the issue, attention was closely focused upon the merits and demerits of the Code which virtually resulted in a reacceptance of the Code by the industry. The Code now, therefore, is stronger than it was before. Thirdly, this activity brought the inspectors together into a strong unit. For the first time the united strength of the inspectors was felt in the Code revision meetings.

Virtually all of the interests in the Electrical Committee, outside of the inspectors, are commercial. There is a strong delegation representing the manufacturers, and another representing the utilities. These contingents are each unified on important matters. It is well to have the element that comes closest to representing the public interest, and safety as such, unified in its thinking.

NEW HOME MARKET

THERE are several indications that the new home building market is definitely on the way upward. F.H.A. is now engaged in bringing the financing possibilities to the attention of the public. Several radio programs are emphasizing the subject. One of the largest insurance companies has announced a new and very liberal mortgage policy. A building supply manufacturer has a "nothing down" financing plan.

These are pretty substantial straws showing the way the wind is blowing. It is hoped that the contractors handling the electrical installations in these new homes will realize that with all of the improvements being promoted by other construction and house furnishing interests, it is going to require strenuous selling to get the right electrical job. There is more competition than ever for the home builder's dollar.

YOUR CONGRESSMAN

THESE are momentous times in Congress. Decisions involving new policies and vast sums of money must be made. What is right?

The representatives in Washington are looking to their constituents more than ever for the answer.

Is NRA a failure or has it really helped employment and business? What about the 30-hour week, and unemployment and old age pensions? Shall prevailing wages be paid on the federal construction projects? Shall they be done by the Government or by contractors? Should the contracts for the mechanical and pipe trades be separated from the general contracts?

On these and other subjects Congress can act intelligently only when it hears from the people back home. The electrical contractor has much at stake in these matters. He should tell his congressmen and senators where he stands and what he expects of them.

Congress is fed up with the paid voice of the lobbyist. Congress wants to hear from home. Never before has Congress buzzed so strenuously for help and suggestion from the individual.

We urge every electrical contractor to write to his representatives in Washington and express himself on the problems now before Congress. In a situation such as this, every voice is heard.

MILLIONS FOR FARM WIRING

THE provision for one hundred millions for rural electrification contained in the President's four billion and over work relief bill, offers an opportunity to the electrical contracting industry. Dependent upon the type of construction and right-of-way expenses, this sum of money should provide for the erection of between fifty and one hundred thousand miles of rural line. That, however, is only a part of the story, for in addition to the lines, there is the job of farm electrification.

The customary density along a rural high line will be anywhere from two to ten farms. If five farms per mile is taken as an average, it means the wiring, lighting and motorizing of anywhere from a quarter to a half a million farms. This figure is more significant when it is understood that less than eight hundred thousand farms are now supplied with electric service.

The catch to the matter, however, lies in the manner in which the appropriation is handled. Is a government bureau to select the location for each rural line and then throw the construction of it open to wide competition, or are the power companies or the contractors to promote the lines, backed by federal money? It makes a big difference both as to cost, effectiveness of the expenditure and character of service that can be expected.

If every electrical contractor is to be permitted to bid, the quotations will be such as to scare away those competent by past experience to do the work effectively. The erection of high lines involves a lot of problems not met in general wiring practice. It also involves the training of men, because there are not very many trained mechanics for this class of work.

Who is going to purchase the materials? If the government or anyone else is to purchase the poles, wire and other necessary equipment and contract only the labor, there is a tremendous element of risk involved for the contractor. To push the work through most efficiently, the contractor must at all times control the materials.

It will be some time after the bill is signed before the work can begin. In that time the National Electrical Contractors Association, and the Edison Electric Institute might well jointly endeavor to make Washington see the necessity of spending this money so that the greatest good to everybody can come of it.

CIRCUIT PROTECTION

SO extensive is the use of electrical appliances and apparatus becoming, that we are constantly facing the problem of providing more adequate wiring by installing circuits of greater capacity. These circuits naturally are protected by larger fuses or breakers. Is this proper?

The new revision of the National Electrical Code provides for a 60-amp. heavy duty appliance branch circuit to supply permanently connected appliances of a minimum size of 1,650 watts or heavy duty outlets. What is to protect these devices or the wiring from the branch circuit to them? Has sufficient study been given to the necessity for such protection and the possible consequences without such protection?

In other words, as the load demand requires larger circuits with larger protective devices, there is less and less protection to the devices themselves. The current flowing may not be enough to blow a 60-amp. fuse, or whatever size the circuit takes, but still be sufficient to create a considerable hazard on any lower amperage device or its connections.

Before we go much further in providing for such circuits in the Code, might it not be well then to carefully consider the problem of automatic protection not only from the standpoint of the branch circuits, but the devices and their connections as well?

\\\ code chats ///

A MONTHLY DISCUSSION OF WIRING PRACTICE AND QUESTIONS OF INTERPRETATION, PRESENTED WITH A VIEW TOWARD ENCOURAGING A BETTER UNDERSTANDING OF THE NATIONAL ELECTRICAL CODE

CONDUCTED BY F. N. M. SQUIRES
CHIEF INSPECTOR, N. Y. BOARD OF FIRE UNDERWRITERS

WIRE SIZE ON MOGUL AND MERCURY VAPOR BRANCH CIRCUIT

Please explain Section 2008-a 3. What is the proper size of wire and fuse for this group of 4,000 watts?

If the group referred to above has a rating of 4,000 watts at 120 volts the current would be approximately 33.3 amp., in which case 35-amp. fuses might be employed and No. 8 wire would do. At 110 volts the current would exceed 35 amp., in which case No. 6 wire would be required and then fuses larger than 35 amp. could be used.

Also, probably with 110 volts the initial current would require fuses larger than 35-amp.

The effect of sub-paragraph 3 of 2008-a is that where the group of lamps is in a single frame and controlled by a single switch, the larger capacity fuse may be used. But in any case the wire used must be of sufficient size to be protected, according to rule 612, by the fuse used.

CONCEALING THE GROUND WIRE

May the grounding conductor of circuits and equipment as permitted in rule 908-h be run in concealed spaces, as in hollow spaces of building walls?

We must also refer to rule 908-d, in which we find that the grounding conductor can be installed under the rules of any system recognized in Article 5.

If the wire is a common one, as mentioned in 908-h, and is not concealed it may be bare and fastened to the surface over which it is carried. If, however, we wish to conceal the grounding conductor then it should be run in a manner approved for concealed work, such as conduit, electric metallic tubing, armored cable, etc., except that the wire may be bare or insulated.

USE OF COMMON GROUNDING CONDUCTOR

Is it permissible to use the system grounding conductor as a protective grounding conductor for grounding the armor of the interior wiring circuits?

Yes, this is permissible according to rule 908-g, providing the grounding conductor is not smaller than No. 4, if run in conduit or metal armor of sufficient size to meet the requirements of rules 908-k or l, and provided that there are at least two additional grounding connections on the system.

SEPARATE SERVICE FOR GARAGE

I note with considerable interest your comments under the caption of "Separate Service for Garage" in the December issue, and since there have been a number of differences of opinion in reference to the interpretation of Section 405-k of the Code, and as your comments do not, in my opinion, agree with the official interpretation No. 63, I am wondering if perhaps there may not be some difficulty encountered by electrical inspectors in this; that perhaps electrical contractors reading your comments will feel that those inspectors who have been adhering to the official interpretation are wrong. It is true that the interpretation No. 63 was handed down in 1930, but inasmuch as the wording of the Code Rule has not been changed, I feel that it should be adhered to.

Personally, I do not feel that the rule as contained in the Code is justifiable or necessary, and I very much prefer accepting installations as set forth in your comment, and my only reason for writing you in reference to this matter is because of the differences of opinion and I feel that through the medium of the space given the Code Chats in ELECTRICAL CONTRACTING *a great deal can be done toward eliminating such differences of opinion.*

We wish to thank our correspondent for his frank letter as it indicates that these Code Chats are serving a helpful purpose in an understanding of the Code. The letter also shows that there is still confusion over rule 405-k.

There can be seen, however, no conflict between Official Interpretation No. 63 and the Code Chat referred to in the December issue.

Interpretation No. 63 says that rule 405-k carries the intent to make possible the independent disconnection of each of several buildings which are fed from one service. This interpretation does not go into the matter of the sort of switch required nor its location.

Our Chat in the December issue pointed out that the switch did not have to be of the service entrance type nor located as a service switch; i.e., be at the point of entrance of the conductors to the garage.

Rule 405-k specifically mentions "a suitable feeder-control switch" and carefully states that while this switch may be located at the entrance to the building served, it also states that it may be located "further back on the

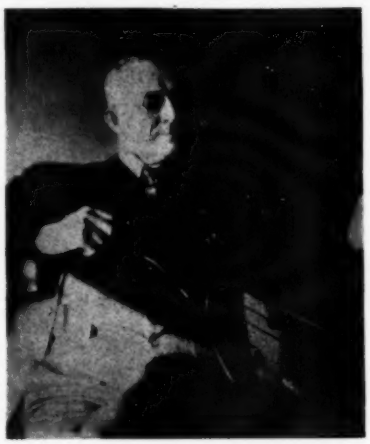
line," which, of course, could be in the main building.

The real difference between the wires to the individual outbuildings or garages and the service wires to the main building is that the service wires have no fuse protection until they reach the building, while the feeder wires to the other buildings have fuse or circuit breaker protection.

MEASUREMENT OF GROUND RESISTANCE

How can you measure the resistance to ground, as in Article 907-d, of a continuous metallic underground water piping system or a driven or buried electrode?

Probably the most simple and easiest way of measuring ground resistances is by means of an instrument called the "megger." This gives resistance measurements directly in megohms. The manufacturers of these instruments furnish instructions and data for using the meggers for such purposes, as well as the extra electrodes necessary for these measurements.



Announces Thirty-seventh Anniversary—The outstanding buildings wired by E. C. Bennett and Company, Omaha, Neb., are prominently featured in an 8-page bulletin which was recently prepared to advertise the company's thirty-seventh year in business. E. C. Bennett, its founder, is still actively engaged in the business. He started in the electrical contracting business with the Boston Edison Electric Company, helping wire Boston's first theatre, and later having been employed as general foreman in charge at the Columbia Exposition in Chicago. The Northwestern Bell Telephone Company building; Union Stock Yards office building; Union Pacific headquarters; Barker Block, and the Redick Tower, all of Omaha, are some of this company's principal wiring jobs.

The Cleveland Tractor Company says—

"WE FIND DAYTON V-BELT DRIVES MUCH MORE EFFICIENT"

● Today Dayton V-Belt Drives are used on all types of machines in the highly efficient plant of the Cleveland Tractor Company. In speaking about these drives, Andrew Fussner, the Master Mechanic, says: "In addition to greater efficiency, these drives have effected real power savings. Previously power was supplied to run all machines in a department or building when, frequently, only a few machines were being used. Further, we find that maintenance costs are much lower—the plant is cleaner and safer and much valuable floor space has been saved by using these individual drives. Thus, our total savings in a year are very much worth while."

Engineers and Production Managers in thousands of plants of all kinds have secured similar results by installing Dayton V-Belt Drives. Here are some of the reasons why. Dayton V-Belts are "built-to-bend." Their exclusive and patented construction makes them more flexible. They are die-cut, not molded. They accurately fit the grooves of all standard pulleys. Their rigid crosswise construction prevents distortion—there is no slipping or weaving. This means smoother running . . . positive speed . . . less tension . . . less wear on bearings. Machines last longer and there's practically no maintenance cost.

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● *No other V-Belt combines such positive crosswise rigidity with such extreme flexibility.*

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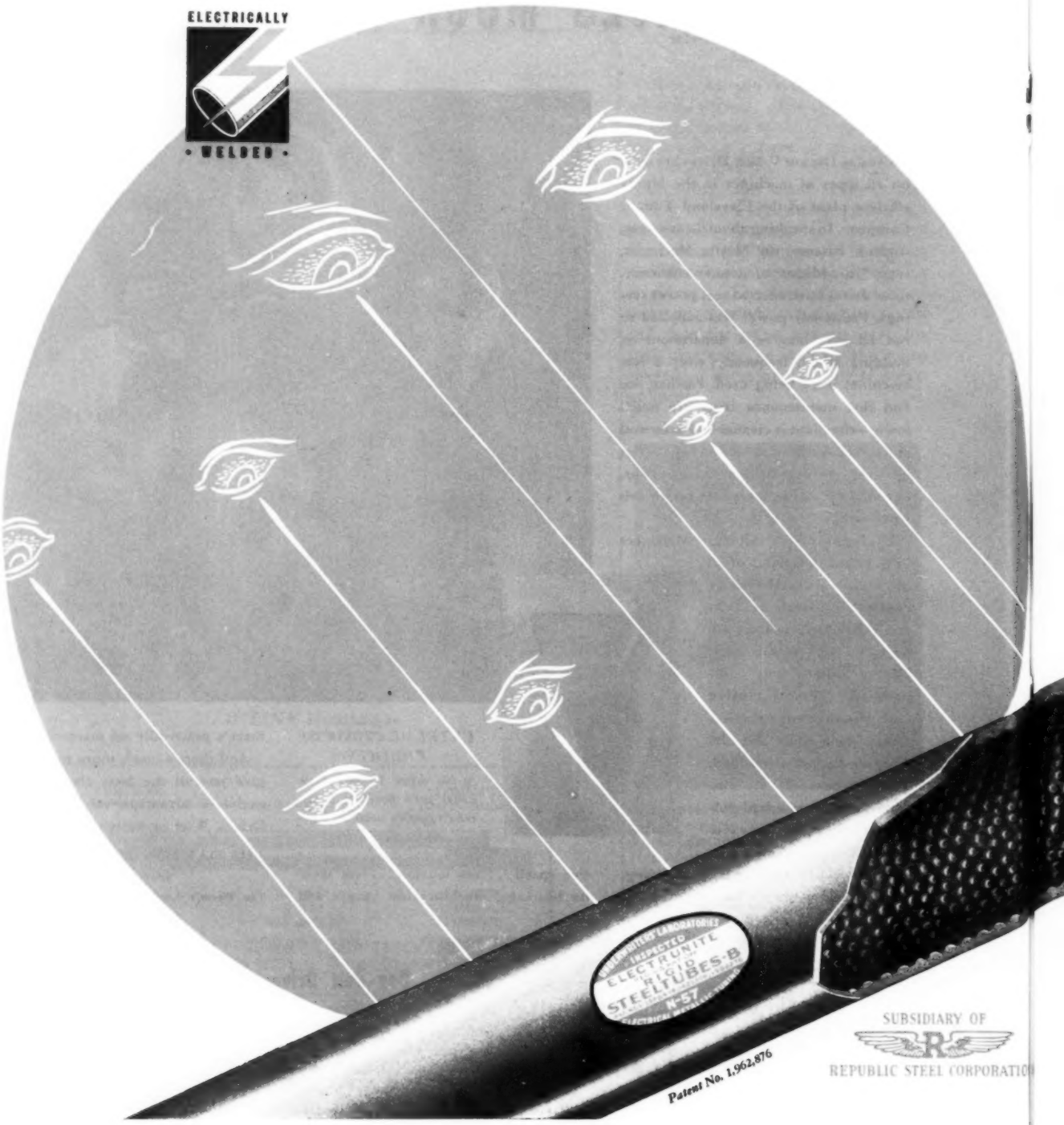

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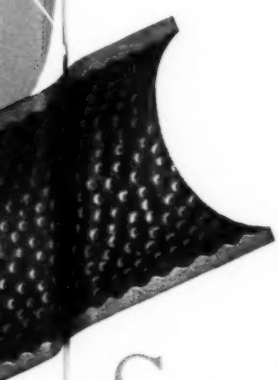
Electrunite Steeltubes is an achievement that has been years in the making. The eyes of the electrical industry are focused on it, because here, in a single product, are all the fine qualities that building and plant owners, engineers, architects and electrical contractors have wished for in conduit. Nor, fortunately, are the qualities intangibles. They can be seen and valued through actual experience.

Here is an electrical metallic tubing requiring no threading, and giving adequate electrical and mechanical protection without added useless weight—that is easier to cut and bend—that requires only three simple fittings to adapt it to any job—that takes advantage of a patented inside surface to speed up wiring approximately 35%—that actually costs less with all fittings than old-style conduit—that saves time and money on every contract.

Contractors looking for a way to make a better profit, and at the same time do better work, are urged to give Electrunite Steeltubes a chance to demonstrate its possibilities. Write for a sample, or ask your supply house to furnish it on the next contract you take on close competition. The results will be startling—and profitable.



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CODE AUTHORITY NEWS

Material for this Department is furnished by The Electrical Contractors' Code Authority headquarters staff

TERMINATION OF STAYS AGAIN ASKED

The Code Authority, in view of the recent advice of N.F.M.A. to all electrical manufacturers that they may ignore the provisions of the Electrical Contractors' Code while engaging in electrical construction work, is making every effort to secure the termination of the automatic stay granted to N.E.M.A. before the Code was ten days old. The application for this stay was originally filed with the Administration November 19 last.

The Code Authority is now urging the termination of the stay on the grounds that the Code exemption fully protects the electrical manufacturers, while the stay not only makes it possible for them to unfairly compete with electrical contractors, but such unfair competition is already existing as the result of this stay.

CONSTRUCTION INDUSTRY INTERSTATE

In a recent memorandum to all regional, district and local committee members, the Code Authority points out that its chairman, L. E. Mayer, and executive officer, L. W. Davis, after studying the situation at first hand in Washington, could find no indication but what the construction industry fell within the classification of "interstate" and therefore of the list of codes to be retained.

It was also pointed out that the machinery for code enforcement was being strengthened and that an improvement in compliance could be expected.

DEPOSITORY DIRECTORY SUPPLEMENT

A 32-page supplement to the Bid Depository Directory is now being prepared and will be distributed shortly. It contains a list of all of the new bid depositories, or revisions of bid depository jurisdiction since the original list was compiled and up to March 22.

NEW BUDGET THIRD SMALLER

The new annual budget required by N.R.A., as submitted to Washington, calls for expenditures of approximately one-third less than contained in the original budget. In preparing this budget the Code Authority has taken into consideration the probable upward trend in building construction this year.

The actual expenses will be kept at the same level as formerly until such time as additional building shall bring its larger assessment return. The additional funds so secured will make it possible for the Code Authority to engage more extensively in field work.

By the end of this month the Code will have been in operation one year, and in that time the money spent in administrating the Code will have been less than $150,000, which is about a third of the sum originally budgeted.

PORTLAND ON 30-HOUR WEEK

The area agreement of the Portland region including three counties in Oregon and two in Washington, as signed by the President, provides for a 30-hour week of five 6-hour days. The area scale is $1.20 per hour.

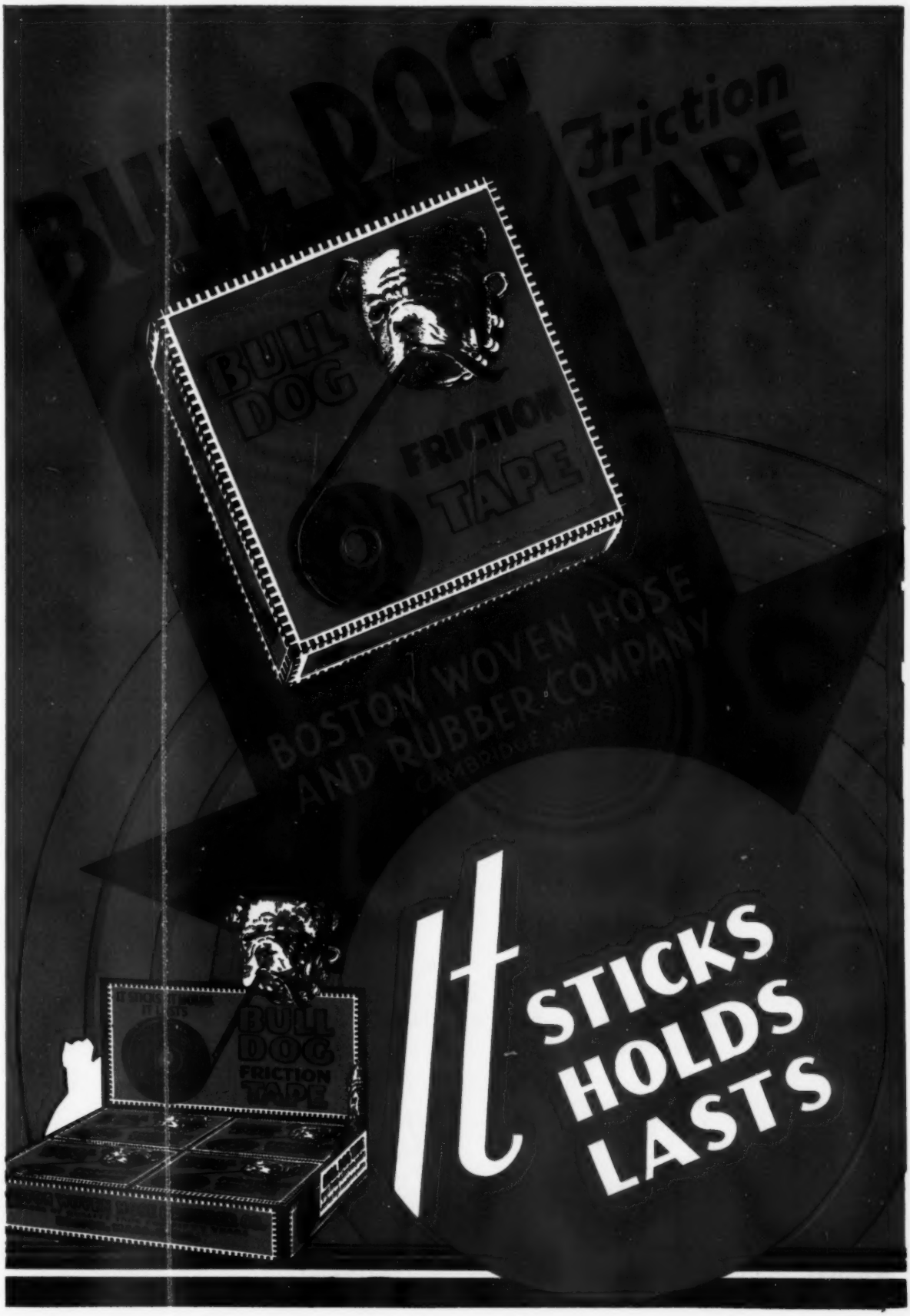
WITHDRAWAL OF BIDS

The recent memorandum from Washington, advising local committees to refrain from ordering bidders to withdraw bids for alleged code violations, and which caused so much consternation in local administrative circles, is not as serious as it seemed at first, the Code Authority finds. Upon investigation it develops that while a local committee might not order an alleged violator to withdraw his bid, there is nothing to prevent the committee from advising that contractor that the committee finds he is a violator. The committee shall then inform the local compliance office that if the bid is not withdrawn, prosecution is to start. There is nothing in the code that prevents a contractor from voluntarily withdrawing his bid.

COTTON CODE AGREEMENT

The proposed agreement between the cotton textile and the construction code authorities, and approved by the latter on March 8, provides that the construction code shall not apply to operations by the cotton manufacturer on his own premises when confined to repair and maintenance work and minor items of replacement, alterations and additions done by the manufacturer's permanent and regular employees.

Objection, however, has been raised to this by a group of electrical contractors wishing to limit the definition of "minor items" as follows: "Shall be construed to consist of only such operations as the replacement of defective apparatus or material, and which replacement or alteration are not part of a program of replacement or modernization." It is further desired to limit this work to the manufacturer's regular and permanent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employees "engaged at all times in one craft."

As a result of this objection, the Code Authority has requested a hearing before action is taken.

HOOLEY PERMANENT CHAIRMAN REGION NO. 2

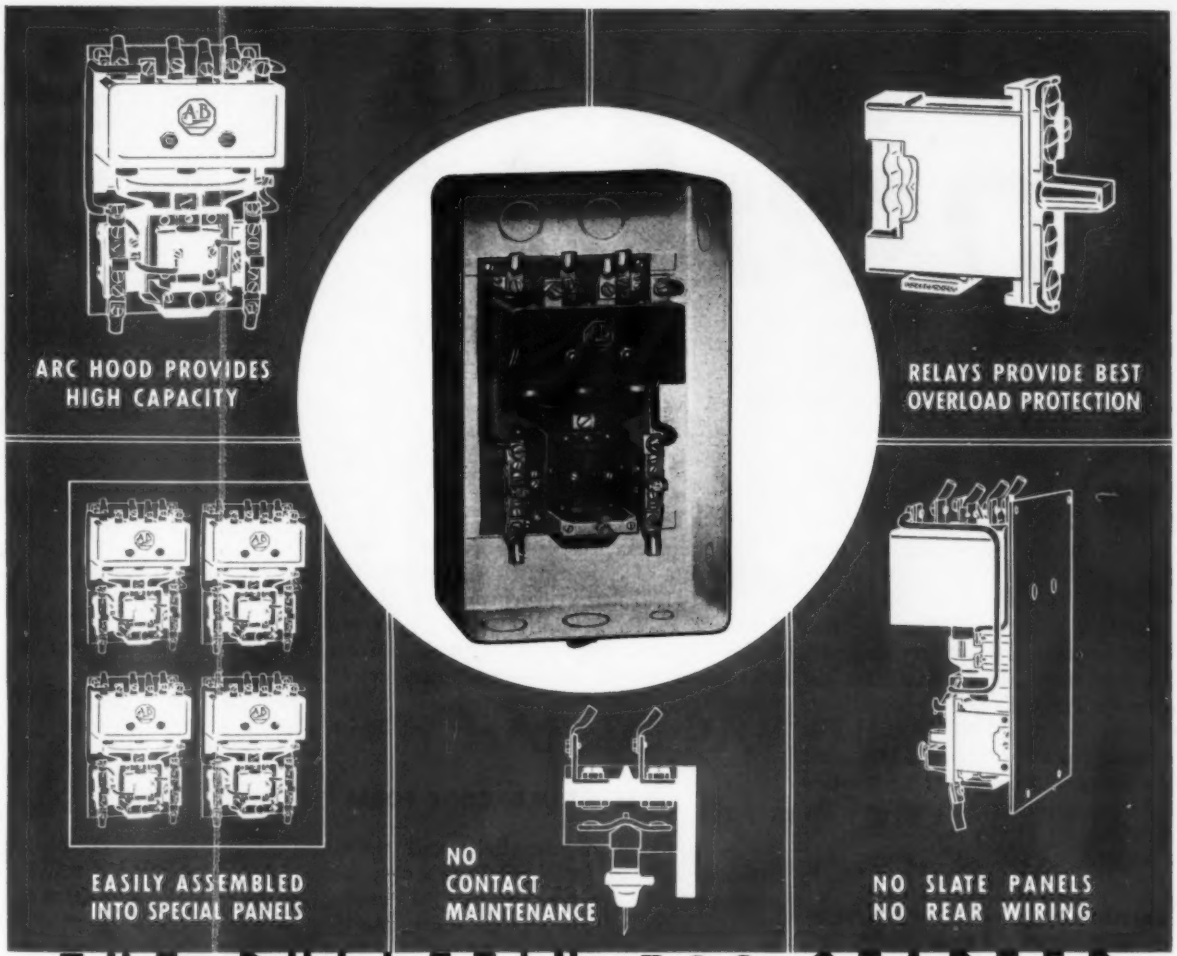
John W. Hooley, who for the past two months has been temporary chairman of Region No. 2, during the absence of J. G. Livingston, has become permanent chairman upon the latter's resignation.

Mr. Livingston, however, retains his place as a member of the Code Authority.

L. A. C. COVERAGE EXTENDED

The latest report to Washington shows 358 local administrative committees for the Electrical Contractors' Code, and 90 district administrative chairmen. While the actual number is not much larger than it was a few months ago, the coverage has been greatly extended. This has been brought about by the dissolution of a number of committees which were not functioning, and throwing the area into nearby areas and also by extending areas.

Has Important Industry Jobs—Beginning in 1931 as secretary-manager of the Tri-Cities Electrical League, H. P. Wilson has since been elected secretary of the Quad Cities N.E.C.A. chapter comprising Davenport, Ia.; Rocky Ford, Moline and East Moline, Ill. With the establishment of the NRA Code Authority, Mr. Wilson assumed this work also as secretary and treasurer of the L.A.C. for the Tri-Cities area which comprises three counties in Iowa and three counties in Illinois. He is also a member of the board of aldermen in the city of Moline, Ill., and serves as chairman of that city's fire and light committee.



THE BULLETIN 709 STARTER

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Why? Because Bulletin 709 A. C. starters were designed by men of practical wiring experience—there is plenty of room for motor and line wiring. Knockouts are provided in all sides and back. The white cabinet interiors help tremendously in dark corners. There are other outstanding advantages which make Bulletin 709 starters so popular with electricians, maintenance men, and contractors.

HIGH CAPACITY—The high current breaking capacity of the Bulletin 709 solenoid starter assures reliable performance even under severe loads.

NO CONTACT MAINTENANCE—The silver alloy contacts require no maintenance. To obtain maximum life and satisfactory service, it is important that contacts should never be "dressed."

OVERLOAD RELAYS—Thermal elements are out in front. Relays are reset without opening cabinets. A single series of thermal elements covers the three sizes of Bulletin 709 starters.

NO SLATE PANELS—Bulletin 709 mechanisms are self-insulated. There is no back panel wiring. All terminals are front connected for easy wiring. Troubles due to broken or grounded slate panels are eliminated.

MAXIMUM RATINGS—15 H. P., 110 V.; 30 H. P., 220 V.; and 50 H. P., 440-550 V.

WRITE FOR BULLETIN 709—Every electrician, maintenance man, and contractor should read Bulletin 709. Write today for your copy.

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BULLETIN 709 SOLENOID STARTERS

CONTRACTING news

INFORMATION OF INTEREST TO ELECTRICAL CONTRACTORS CONSISTING OF ITEMS OF NEWS, SHORT ARTICLES, PRACTICAL IDEAS, ETC., OUR READERS ARE INVITED TO CONTRIBUTE TO THIS DEPARTMENT

SLIDING SCALE FOR FOREMEN IN PITTSBURGH AGREEMENT

A sliding scale of wage for foremen, depending upon the size of the job is provided for in the area agreement for Allegheny County, Pa., which became effective on March 18. For jobs costing less than $1,000, the scale shall be the same as for a journeyman, namely, $1.50 per hour. Jobs running from $1,000 to $25,000, shall pay foremen $1.62½ per hour, while for jobs costing $25,000 and over, the scale shall be $1.87½ per hour.

CALIFORNIA CONTRACTORS REVISE ELECTRAGIST LABOR UNITS

Culminating a two year study, the Los Angeles branch of the Southern California Chapter, N.E.C.A. has published recently a revised manual of labor units for estimators, based with approval of the N.E.C.A., on the "Electragists Estimating Manual." The new units have been developed to reflect more accurately the experience of contractors operating under conditions prevailing in Southern California. The units in the new manual are from 15 to 30 per cent below those in the Electragists Manual. In addition to the revised tables, a number of original tables have been included.

Convenient form and arrangement for routine use by the estimator has been a prime objective in compiling this manual. It is printed on punched letter-size sheets and stapled loose-leaf in a durable paper cover, facilitating addition of new sheets as changes and new data are developed. The fifteen pages of tables are grouped into sections covering related operations, each section having a clearly labelled thumb-tab for rapid reference by the estimator.

The committee, responsible for the compilation of this revised manual are: L. H. Ellett, Chairman, Los Angeles; P. R. Mactolf, Glendale; R. M. Fry, Los Angeles, C. A. Rowley, Pasadena; H. H. Hamm, Los Angeles; C. J. Bennett, Los Angeles; H. C. Nicholas, Los Angeles.

JOHN ELLENBECKER HEADS MINNESOTA CONTRACTORS

The seventh annual convention of the Minnesota Electrical Association and the second annual convention of the Minnesota Electrical Council were held jointly at Red Wing, Minn., February 21-22, with more than 100 delegates in attendance from over the state.

New officers were elected as follows: John Ellenbecker, St. Cloud, president; Ray Mracheck, Rochester, vice-president; and William Ritt, St. Peter, secretary-treasurer. C. J. Ahlers, Red Wing; J. W. Hruska, Mankato; Louis Gordon, Albert Iea; A. J. Naylor, Bemidji; E. J. Micka, Hibbing; and C. W. Turner, Faribault, comprise the state executive committee.

The Electrical Council directors are John Ellenbecker; L. E. Kamp, Winona; E. J. Micka, Sam Newstone, Montevideo; W. A. Ritt and D. Ehlert, Duluth.

The 1935 summer meeting will be held at Duluth (Minn.) in July.

PRESENT N.E. CODE FORM TO BE RETAINED

The proposal of the light and power group that the National Electrical Code be reduced to a set of general rules with an appendix of recommended practices, was rejected by the Electrical Committee, N.F.P.A., at its biennial meeting, held in the rooms of the New York Electric Association, during the week of March 19. The committee also recognized the use of bare neutral for interior wiring, when limited to braided assemblies for use in range wiring only.

The utilities' proposal for Code revision was reported on by a special committee headed by Dr. M. G. Lloyd of the Bureau of Standards. The report of this Committee which was accepted recommended a complete editorial revision, with the retention of all of the installation detail, but not manufactured products standards, except for built-on-the-job products.

A special committee, with Dr. Lloyd as chairman, and with such additions as the chairman of the Electrical Committee may make, is to prepare a plan for revising the Code, together with a sample of the revision for consideration at a special meeting to be held in Chicago a year hence. If the sample so compiled is acceptable as to form and arrangement, it will be used as a guide for the preparation of the 1937 edition.

It was voted to continue trial installations of bare neutral with some modifications in the committee report, limiting the installations to new installations in approved assemblies.

The changes to be made in the next edition of the Code are very largely editorial in nature. The suggestions of the article committees were for the most part followed.

There was considerable change in Article 4, principally as an attempt to bring related matters together in one place. There was much discussion relative to the new A.E.I.C. service cable assembly which it was decided must be protected when exposed to mechanical injury.

Under article 5 the conduit tables are to be changed, increasing the size of conduit for No. 8 wires, because of the larger overall diameter. The new Code is also to contain a table of conduit sizes to accommodate different sizes of wires under the 40 per cent rule. A new trend in wiring may be noted in the action of the committee, approving the use of rubber-sheathed multiple conductor cable

YOUR CUSTOMER HAD TO PAY THEM!

Sell him fuses which Eliminate Needless STOPPED TIME

Workers STOPPED by a blown fuse means lost production—but wages go on. Show customers how needless stops can be eliminated by fuses which protect TIME as well as motors—and see your fuse sales jump.

Modern Jefferson Super-Lag Fuses protect TIME. They do not blow the moment current rises—do not stop the motor if the overload is only temporary. But they operate positively before the overload has time to become dangerous. It is this "wait" which gives the motor a chance to recover speed—which eliminates needless STOPPED TIME.

Jefferson Super-Lag Fuses are made in both knife-blade and ferrule types, in all capacities to suit every customer need. Speed up fuse sales by selling TIME protection along with motor protection.

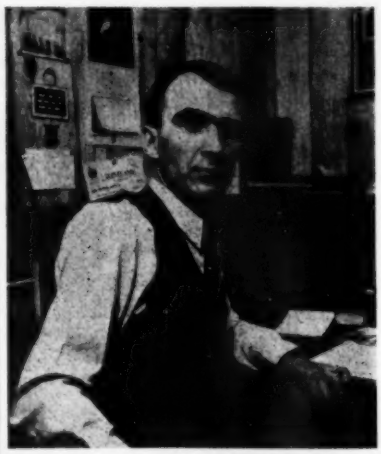
FUSE CHART HELPS

The Jefferson Fuse Chart tells at a glance the proper size fuse to use for adequate protection—help for you, help for your customers. Get your Fuse Chart No. 18 today.

The secret of Jefferson Super-Lag performance is in the lag plate on the Super-Lag link. This plate delays the normal fuse action, provides a time interval or lag by absorbing temporary heat rise. This time-lag prevents the fuse from blowing on harmless temporary overloads—saves needless STOPPED time and link replacements.

JEFFERSON ELECTRIC COMPANY
BELLWOOD (Suburb of Chicago) ILLINOIS
Canadian Factory: 535 College Street, Toronto

JEFFERSON Super-Lag RENEWABLE FUSES



Uses Branch Office Methods: B. M. Nilsen, manager of Electric Service, Inc., Akron, Ohio, finds small types of work profitable by operating in a compactly arranged shop under an accurate yet simple system of billing and office records. This concern is allied with a larger firm in a nearby city, at which point the bookkeeping details are handled monthly, including the checking of material purchases and billings. By being relieved of such routine detail, more time is available for selling and supervising jobs with a result that a nominal amount of small wiring jobs produce a satisfactory showing, due to limited overhead and careful control of business details.

on insulators as a wiring material for breweries, ice plants and other similar wet locations. A new section 513 approves the use of service entrance cable assemblies for interior wiring. These assemblies with bare neutral may be used for range wiring.

The difficulty of securing grounds on farms is to be recognized in the preamble to Article 5, recommending the use of a wiring method which does not employ metal enclosures for wires on premises where it is not possible to secure a water pipe or other permanent low-resistance ground.

The recommendation that the covering on conduit boxes and fittings over 100 in. in size should be of zinc or other conductive material was rejected.

The whole subject of non-tamperable plug fuses was put over to 1937. A technical sub-committee is to go into the entire subject of fuses. At the same time a technical sub-committee will consider the subject of small circuit breaker design and operation.

There was considerable revision of Article 20 on wiring installation design, among the revisions being the provision for heavy duty appliance

PRECISION
Creates Extra Value

Form VS
Synchronously motored—equipped with omitting device—for controlling sign or window lighting.

Materials may be the finest quality but the accurate shaping of these materials to fit a specific job depends largely upon the ability and experience of the attending craftsmen.

Apply this truth to time-switches and you'll find SANGAMO TIME-SWITCHES have extra value created by expert craftsmen with more than 30 years experience in precision instrument manufacture.

That is why SANGAMO TIME-SWITCHES stand up—all parts fit accurately—all mechanisms operate exactly as the designing engineers intended them.

That is why SANGAMO TIME-SWITCHES can be depended on to do the job efficiently—at all times—in all weather.

That is why they require a minimum of service and this is why your time-switch sales will be larger and your profits more secure; if you sell SANGAMO TIME-SWITCHES at every opportunity.

***Talk and Sell Extra Value*—SANGAMO**
PRECISION TIME-SWITCHES

SANGAMO ELECTRIC COMPANY • SPRINGFIELD, ILLINOIS

REPAIR SERVICE SHOWS "NEW TYPE" PROFIT FOR APPLIANCE DEALER

Proves Key to Live Prospects

The most profitable way to discover out-of-date appliances or the need of additional ones lies in carefully checking repair department records. Service men can profitably align themselves with appliance dealers for just this purpose.

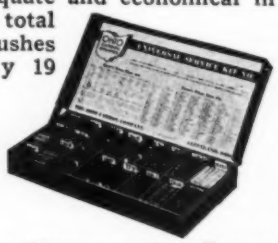
Keep In Contact with 20 Million Appliance Users

About 85% of the almost twenty million washers and cleaners which current statistics indicate to be in use are in the repair stage. While the saturation point is by no means reached, the best market for new appliance sales lies in replacing obsolete equipment or supplying the additional needs of an already demonstrated purchasing power.

Repair Service Cuts High Cost Of Cold Canvassing

Because of wear and oil soaking, motor brushes are the most frequently replaced appliance part. In fact, with a well rounded brush stock and a few other common parts, a repair man is prepared to not only solicit appliance repair work but also to sell worthwhile leads to appliance dealers.

A well rounded brush stock is offered in Ohio's new *Universal Service Kit No. 3* containing brushes, springs and oil wicks to fit over 131 makes of appliances. It is both adequate and economical in having a total of 150 brushes yet only 19 sizes.



Priced at $7.50 net, it offers a means of servicing practically any appliance regardless of make or age thus providing the necessary equipment to locate live prospects on a profitable basis.

ORDER FROM YOUR JOBBER OR MAIL COUPON

The Ohio Carbon Co., E. C.-1
12508 Berea Road,
Cleveland, Ohio.
Gentlemen:

Please send further details about your Universal Service Kit No. 3 including list of 131 nationally known makes that can be fitted.

Name _____

Address _____

City _____ State _____

branch circuits with 60-amp. protective devices, limited to supplying permanently connected appliances between 1,650 and 13,200 watts, or heavy duty 20-amp. receptacles with not more than six to a circuit. The committee also recognizes the new continuous multi-outlet wiring method. Every 5 ft. or less is to be counted as one outlet.

Under Article 33 wireways and busways will be permitted in garages with the same 4 ft. from the floor limitation.

WISCONSIN CONTRACTORS ORGANIZE

A statewide meeting of electrical contractors, sponsored by the Central Wisconsin Electrical Association, was held on March 16 at the Hotel Witter, Wisconsin Rapids, Wis., and was attended by over one hundred contractors, as well as by a number of inspectors and representatives of utilities, manufacturers and jobbers, and organized labor.

One of the major results of the meeting was the decision to draft a state licensing bill to be introduced at the present session of the legislature.

A legislative committee was appointed consisting of R. J. Nickles, Madison, and M. F. Hodge, Medford, for the contractors, and E. J. Brown, Milwaukee, for organized labor.

Several other matters discussed and acted upon had to do with better representation on the State electrical code advisory committee, vocational education, and the matter of a statewide organization. Following the general meeting, the executive committee of the C.W.E.A. voted to change the name of the organization to Wisconsin Electrical Association.

Interesting talks were delivered by E. T. Berkanovick, a representative of the State N.R.A. director; John E. Wise, chief engineer of the State Industrial Commission; E. E. Gunn, State director of vocational education, and Wm. A. Ritt, secretary-manager of the Minnesota Electrical Council.

Officers elected for the year were: M. F. Hodge, Medford, president; M. C. Rilling, Wausau, vice-president; M. L. Carey, Wisconsin Rapids, secretary; W. Merkel, Marshfield,

AMERICAN STEEL & WIRE COMPANY

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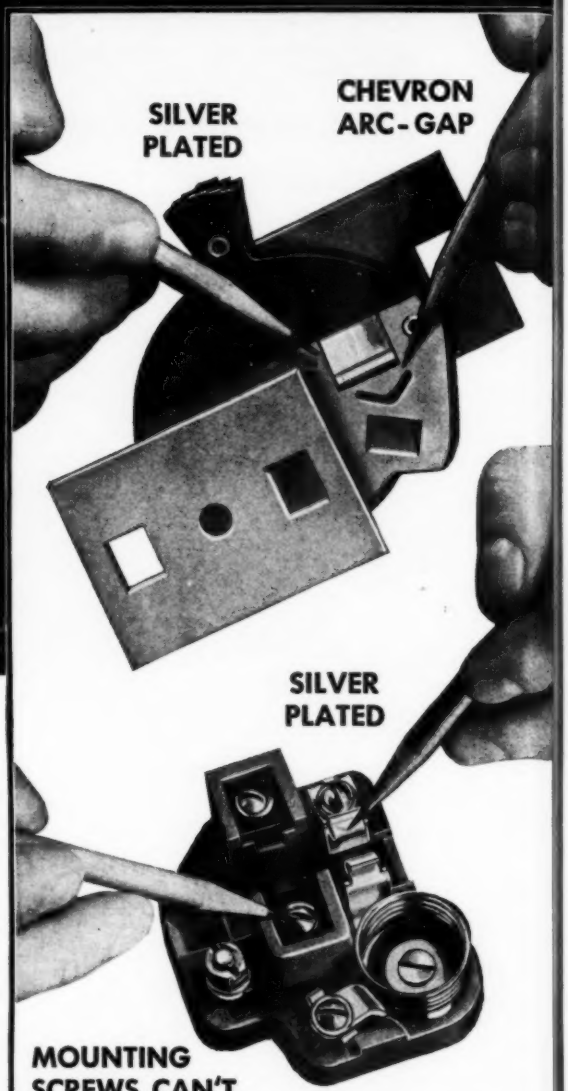
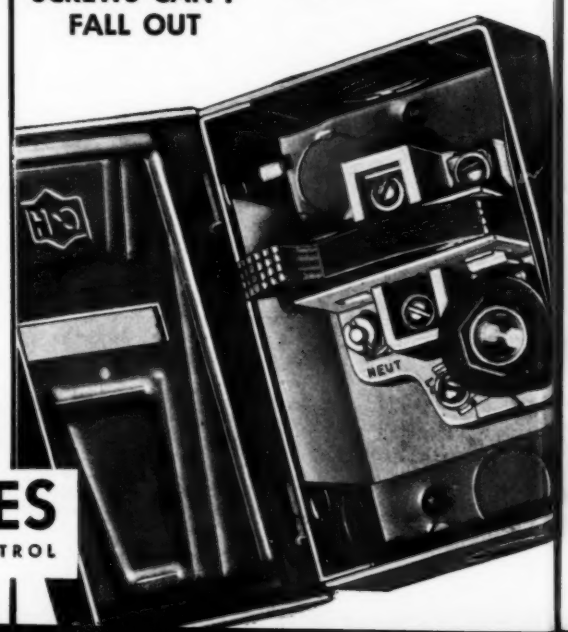
Offices in All Principal Cities

United States Steel Corporation Subsidiary

IT WORKS, ALMOST WITHOUT "WORKS," BECAUSE IT'S AS MODERN INSIDE AS OUT





THE "streamlines" of the new, small C-H Bulletin 4140H2 Safety Switch have caught the eyes, and boosted the sales, of independent electrical contractors and wholesalers everywhere. But even without that newly styled case, this switch is a winner; the new *outside* merely calls attention to equally striking achievements *inside*—features that build sales and repeat business. Read these advancements, all combined in the simplest and sturdiest of mechanisms:

Positive make and break. Plenty of knockouts, some in rear, also on sides near back *edges* to permit direct running of conduit. All contacts silver-plated. Chevron arc-gap kills the arc. Maximum simplicity; no springs or "gimmicks" (see photos) *and* with such further attention to details as: Sufficient wiring space but when desired, mechanism is completely removable to permit the unobstructed pulling of wires; Case arranged so mounting screws are self-locating when mechanism is replaced; Mounting screws can't fall out when mechanism is removed; Lock washers prevent loosening of mechanism in service; screws can be tightened without strain on porcelain base; Insulating fibre glued to sides and back of case for convenience when mechanism is removed; Laminated horn fibre operating handle does not carbonize under arcing—*A switch truly as modern inside as out!*

Suitable as an entrance switch in many localities. Ideal for oil burners, domestic stokers, air compressors, unit heaters, dairies, laundries, ice plants, stores, etc. . . . A switch to use in getting new customers and keeping old ones! CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus,* 1306 St. Paul Ave., Milwaukee, Wisconsin.

C-H

CUTLER-HAMMER SWITCHES

BUILT TO THE FAMOUS STANDARD OF CUTLER-HAMMER MOTOR CONTROL

treasurer; and executive committee, W. Chamberlain, Ladysmith; E. P. Kissinger, Waupaca; C. L. Kehl, Green Bay; E. M. Streich, Merrill, Harry Newman, Eau Claire; and J. A. Staub, Wisconsin Rapids.

ILLINOIS CONTRACTORS TO PAY SALES TAX ON MATERIALS

As a result of a ruling by the Supreme Court of Illinois, all contractors must pay the retailers' occupational tax on all business done with the ultimate consumer. The points involved are covered in a memorandum to the electrical contractors by the Chicago Electrical Wholesalers' Association. This notice shows:

1. Contractors need not pay tax on materials on which they have already paid tax to the wholesalers.

2. Unless billings segregate materials from the balance of the contract, the tax will be payable on the entire bill.

3. Since this tax is to be paid on the sale of materials only to the ultimate consumer, contracts with the general contractor are not subject to tax.

4. Taxes are payable on material sales to the ultimate consumer for deliveries made after March 1, 1935, irrespective of when the contract was entered into.

5. The tax does not apply to sales made for delivery outside of the state, nor for sales made to the United States Government.

DISPLAYS URGE SAFER WIRING

The New York Chapter of the International Association of Electrical Inspectors is developing a standard display for use at exhibits, fairs and meetings, for the purpose of educating the public in safe and adequate wiring.

This work, which is undertaken by the educational committee of the chapter, was first undertaken at the recent Greater New York Safety Conference. As a result of the experience gained at this exhibit, the chapter was able to develop a more comprehensive display for the Greater New York Home Owners' Exhibit, held at the Port of New York Authority Building, during the week of March 24. It is expected that the results of the latter display will enable the chapter to develop a standard which can be used anywhere.

A ROLL O' TAPE

ELECTRICAL FLASHES GATHERED AMONG THE BIG WIRE AND PIPE MEN BY ELECTRICAL CONTRACTING'S FIELD EDITORS

WHAT is the record for boring overhead 2x4's by hand? R. J. (Bob) Hennessey, South Norwalk (Conn.), claims an average time of 7 sec. each for fifteen holes. Who's next?

INVITING trouble calls after office hours, the Electrical Engineering and Construction Co., Des Moines, Ia., has listed the residence telephone numbers of four members of its organization below the company's regular classified telephone directory listing.

WHEN the Paul L. Gilmore Co. of Columbus, Ohio, had the $200,000 wiring contract for the State Office Building an extra effort was made to provide an outstanding electrical installation. Among these special efforts the branch circuit conduits for all upper floors were cut, threaded and bent to measure on the ground, hoisted up in bundles and installed in quick time upon the forms.

UNNEEDED rented space is not allowed to burden the overhead of the Ft. Pitt Electric Co., which maintains headquarters in a Pittsburgh (Pa.) loft building. To meet curtailed business volume with a reduced overhead, a 50 per cent reduction in space requirements was effected by rearranging the tool and stockrooms.

A 12-IN. piece of No. 6 three-wire service entrance cable is kept in the office of the Snyder Electric Company, Akron, Ohio, this being the net waste resulting from using up a coil of this material. This serves as a testimonial of present-day care in handling materials.

BOOTLEG wiring curtailment has made favorable progress in Passaic (N. J.) during the first six months that a contractor licensing ordinance has been in

force in that city. Over 600 Code violation notices have been found and corrected during this short period, according to Arthur Snyer, the electrical inspector. Licensed contractors are cooperating closely in reporting bad wiring conditions to the inspection department.

YOUTH will be served if good motor repair service is rendered, say two youngsters who recently started the Electric Motor Repair Shop, South Norwalk, (Conn.). M. Philip and J. Lysobey, partners in this firm, are both just of age. Business is reported to be coming in fine.

APPROXIMATELY 3,300 Kenosha, Wis., residences have been rewired as a result of electrical reinspections which were made during the past nine years.

PRESIDENT ROOSEVELT has told N.R.A. that it must secure code compliance. In almost the next mail notice was received of the appointment of J. A. (Joe) Fowler of Memphis, Tenn., one of the most highly respected men in the electrical contracting industry, as Tennessee N.R.A. compliance director, with offices in the Cotton States Building, Nashville. The government must mean business.

WHEN contracting is in the jitters for the Hummel Electric Co., Davenport, Ia., George E. Hummel finds Mrs. Hummel bringing in fine special fixture orders for "her own" department.

BELIEVING that electrical men should live in electrically equipped homes, G. C. McAfee of the Central Electric Co., Des Moines, Ia., has owned electric ranges of various types for 25 years. His present home was completed with the gas service being purposely omitted, so that electricity performs every possible home service.

ELECTRICAL contractors of Minneapolis, Minn., continue to receive useful field assistance from the Electrical League of Minneapolis, despite curtailed home building Red Seal prospects. According to E. L. Harris, league secretary, a field man has been kept busy during this lack of new homes on the promotion of garden lighting, home protective lighting, refrigeration, cookery and water heating promotional work. Mr. Harris has been personally active in FHA campaign details.

DEAFNESS renders the ordinary audible fire alarm systems ineffective, therefore M. C. Brooke of the Brooke Electric Co., Columbus, Ohio, employed a red warning light system for the 6- to 18-year-old patients of the Ohio State School for Deaf at Columbus. Forty stations were installed on circuits controlled by a remote operated switch which operated from a relay upon the fire alarm circuit. It is claimed that the lights awaken these children if an alarm is recorded at night time.

PRACTICAL METHODS

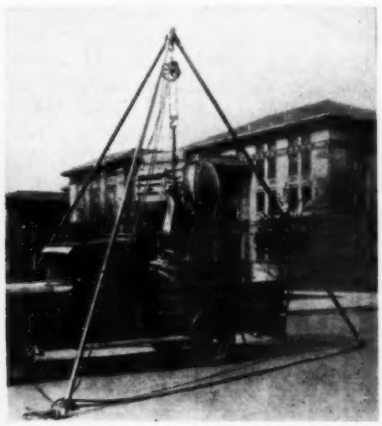
SPACING CONDUIT BETWEEN STEEL BEAMS

A channel iron header for supporting and levelling large conduit runs installed between parallel steel floor beams provides an easy means of establishing the desired routing levels. The channel iron is cut in proper

lengths for bolting to the opposite beam flanges. If the conduit is to follow a higher level than is provided by the actual channel dimension, conduit nipples are installed upon the header bolts, for spacing the channel irons the proper distance above the bottom flange of floor beams. This assembly was used for 1½-in. to 4-in. conduit runs in a recent modernization job installed by the E. J. Electrical Installation Company, New York City.

ADJUSTABLE TRIPOD HOIST

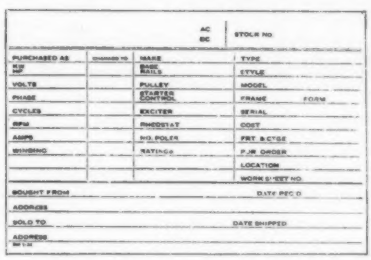
A useful tool for handling heavy cumbersome objects such as large filling station lighting standards, temporary field equipment, motors and other machinery was built by the Franklin Electric and Construction, Inc., of Pittsburgh, Pa. Three 16 ft. pieces of 2½ in. steel pipe were flattened at one end and drilled for a tie bolt. A flat iron bar hangs vertically beneath the tripod, this being drilled at the bottom end for receiving the hook of a chain or rope block. The lower ends of tripod members are threaded for attaching additional pipe lengths as may be necessary for in-



creasing the height of tripod. Ropes may be tied to the bottom ends of each tripod leg to prevent slippage of legs on smooth pavements or floors. This assembly has been used to good advantage upon the roof of buildings as a hoisting boom by using two short legs, tipped outward from the building, a long back brace and a separate guy.

MOTOR STOCK RECORDS

Each item of equipment carried in stock by the Motor Repair and Manufacturing Co., Cleveland, Ohio, is recorded in detail upon a separate 4 in. by 6 in. numbered stock record card. When stock is received such a

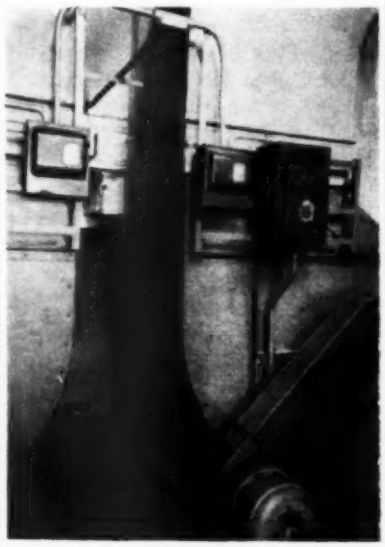


record card is filled out in detail for each item and a number assigned thereto. A stock identification tag bearing the same number is attached to the equipment The record card is filed in a divisional file tray according to the class of equipment, pending its sale. When sold, the identification tag number must check with the stock

record card number and the invoice must also show this stock number. Thus, an invoice for several items of motors, transformers, etc., would show thereon the stock number of each piece of equipment. Sold stock cards are pulled from the divisional stock record card trays as soon as billing is rendered and are then refiled in numerical card trays for permanent future reference. If a customer comes back later on with an inquiry about such purchased equipment, it is simply a matter of referring to the duplicate copy of invoice for the stock number of the equipment in question, and then pull out of the numerically numbered sold card files the corresponding detail cards.

STARTERS MOUNTED ON FAN HOUSINGS

A simple method for providing rigid starter and conduit mountings upon steel fan housings involves the use of angle iron racks. Since it is



seldom permissible to drill into the fan housing, the angle iron projections which form the housing frames can be used as bolting flanges for attaching short pieces of fabricated angle iron as starter frame brackets.

In mounting odd sizes of equipment, an upper horizontal angle provides a bolting surface for all enclosures, the next lower member accommodates the bottom end of the shorter enclosure, while a bottom cross member is used for the lower end of the longer enclosure. By using the correct lengths of angle iron at various points around the fan hous-

ing the conduit and starting equipment can be rigidly supported without drilling into the housing. Thus no conduit needs to be run to an adjoining wall location, the control equipment being kept adjacent to its motor.

ORNAMENTAL WEATHERPROOF PANELBOARD HOUSING

A control panelboard design which offers complete all-year weather protection yet which is easy to operate and which also harmonizes with the surrounding landscaping and archi-

tectural treatment for daytime appearances, was adopted for an outdoor theatre on the campus of the Ohio State University. A circuit-breaker type panelboard was installed upon an angle iron frame and enclosed within an ornamental sheet copper housing. Extra space was allowed for dimmers to be mounted within the enclosure. The enclosure is arranged with double doors, each of the jack-knife hinged type, so as to render the entire width of enclosure accessible when the padlocked doors are opened. The entire assembly is mounted upon an 18 in. high concrete base. The main feeder and the branch conduits to weatherproof outlets about the outdoor theatre are stubbed up into the panelboard from the concrete base. A two-gang stage receptacle is set flush in this base also. The installation was made by the Gustav Hirsch Organization of Columbus, Ohio, in cooperation with the university architect and a local sheet metal contractor, who built the ornamental copper housing.

April New Products

Solderless Connector

A line of copper cup and compression nut type of solderless connectors has been announced by the Square D Company, Switch and Panel division, Detroit, Mich.

This line has been designed to fit in the same space as a solder lug, therefore, it is available for existing installations as well as being optional on new Square "D" range combinations. It is made in two sizes: For No. 14 to No. 4 wire inclusive, and for No. 14 to No. 1 wire, and can be used for either solid or stranded conductors. Positive and permanent contact, free of loosening from vibration is claimed to be easily obtained due to the hexagon nut design. A screw driver or wrench may be employed to tighten this nut so that its rounded bottom surface forces the wire strands into the recess of the copper cup.

Flush Type Angle Reflector

Wilson Lighting, Inc., Chicago, Ill., announces a line of angle type reflectors for flush mounting in show windows. This reflector is claimed to solve the problem of effectively illuminating the upper back part

of the show window when reflectors are recessed in the ceiling. The back part of reflector projects approximately an inch below the ceiling line, thus illumination of the upper back part of the window is claimed to be accomplished. The reflector and polished mounting flange are of one piece, with three mounting holes provided in the flange. It is made in two sizes: 75-150 watt, and 150-200 watt, and fits the standard 2¼-in. shade holder.

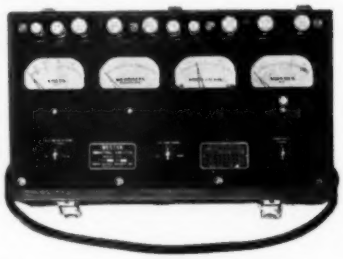
Small Wire Connector

H. B. Sherman Mfg. Co., Battle Creek, Mich., announced the Wedge-Grip connector for service entrance and other small

wire connections from two No. 6 stranded to two No. 14 solid conductors. A hollow copper connector body and a non-removable oval-pointed set screw of non-corrosive metal are claimed to provide a quick method of making safe and strong solderless connections with but a twist of the screw driver. The completed connection is said to be easily taped due to a stream-lined conductor alignment without awkward projections.

Industrial Analyzer

A portable self-contained unit, designed to permit a thorough analysis of plant load conditions, to quickly detect overloaded or underloaded motors, and to analyze power factor conditions is announced by the Weston Electrical Instrument Corp., Newark, N. J. Known as model 639 industrial analyzer, this device was developed for electrical contractors, plant maintenance and



efficiency men, and public utility field service men. It combines four Weston model 610 a.c. instruments, a voltmeter, wattmeter, power factor meter, and ammeter, in an oak carrying case, and is designed for measuring current, voltage, power, and power factor in single and polyphase circuits. The connections that are necessary when making tests with individual instruments are claimed to have been greatly simplified.

Severe-Use Cable

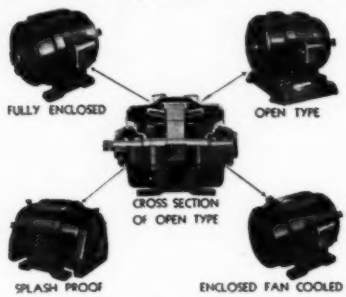
A cable for use under conditions where it must withstand severe mechanical abrasion, such as on mining machines, reel locomotives, and other applications of a similar nature is now available from General Electric Co., Schenectady, N. Y. The finish of this cable consists of a circular-loom-woven sheath, applied in a manner similar to the weaving of a carpet. Under this sheath is a layer of glyptal cement, the sheath being so applied that it is embedded in the glyptal cement and partially embedded in the rubber insulation. This process is claimed to result in a cable that is tough, extremely abrasion resisting, and highly resistant to oil, alkali, and acid.

Fire Alarm Unit

Telafire, an air-tight fire alarm contact unit for use with bells, buzzers, red lights, etc., in homes, factories, stores, and other buildings, has been announced by G-M Laboratories, Inc., Chicago, Ill. This unit employs a mercury tube for closing the alarm circuit, which is sealed against contact corrosion, grease, or other accumulations. The circuit is closed by exterior heat action upon a movable arm that permits one end of the tube to drop, causing mercury to flow around the wires sealed within, thus closing the alarm circuit. Telafire is normally adjusted to operate at 135 deg. F. It is designed for open circuit use, but is also available for closed circuits, and any number can be connected on one alarm cabinet. The device is 3 in. in diameter and finished in red enamel.

Convertible Frame Motors

The P and H line of convertible squirrel cage and slip ring induction motors, offer-



ing all standard frequencies for service ranging from 110 to 220 volts, has been announced by the Harnischfeger Corp., Milwaukee, Wis. These motors are claimed to be convertible from open type to fan cooled, splash-proof or totally enclosed construction. This is accomplished through the design of the frame, end heads and bearings to permit interchangeability in the four above mentioned types of single or multi-speed squirrel cage and slip ring motors.

Back Plate Bell

A line of large vibrating and single stroke bells equipped with separable mount-

ing back plates has been announced by Edwards and Company, Inc., New York City. This line has been named "Adaptabel," since the back plate may be mounted directly on the wall or on any type of conduit box, wiremold, or similar fitting, after which the bell may be hung on two lugs and pushed into position. Ease of installation and wiring connection is claimed. A line of horns is available employing the same mounting method.

Manufacturers News

NEW CONDUIT STANDARDS

The Rigid Steel Conduit Association announced the publication of new standards for zinc coated and enameled rigid steel conduit.

These standards which represent many years of research, improvements and standardization in rigid conduit give dimensions, detail and test requirements, threads, couplings, elbows and nipples. The zinc coated standards go further and specify the chemical test for extent and uniformity of zinc coating which is now standardized at 4-dip.

A. G. Mason, formerly wiring supply sales manager of the Graybar Electric Co., New York, N. Y., has joined the headquarters sales organization of the Thomas & Betts Co., Elizabeth, N. J., and will be located at that point.

A series of descriptive folders on the three types of Pittsburgh standard rigid conduit have just been published by Enameled Metals Company, Pittsburgh, Pa. These folders include descriptions of Pittsburgh standard thread protected enameled conduit, the electro-galvanized conduit, and the new hot-dip galvanized with zinc-coated threads.

Appleton Electric Co., Chicago, Ill., announces the appointment of Hollis R. Johnson as its sales representative in the southwest territory to succeed P. B. Chaney, who passed away in February. Frank C. Lewis, formerly with Trico Fuse Mfg. Co., Milwaukee, Wis., has been appointed as Appleton sales representative in the southeast territory, with headquarters in Atlanta, Ga.

The General Electric Vapor Lamp Co., Hoboken, N. J., has available for distribution a new 12-page bulletin DM 105 which illustrates typical installations of G. E. high intensity mercury vapor lamps, and describes the advantages and efficiencies claimed for this recent development for high bay lighting.

NEW NAME FOR BEAVER TOOL MAKERS

The makers of Beaver pipe tools recently announced a new firm name "Beaver Pipe Tools, Inc.," to begin their 35th year in business. This is a change in corporate name only from the former name, "The Borden Company," and is designed to identify the company name and product for customer convenience. Some confusion had been experienced in certain district offices where a mix-up in mail occurred with a milk products company of the same name.

Leaflet 2182, descriptive of Seal-Clad induction motors, with protected windings, has been issued by Allis-Chalmers Manufacturing Company, Milwaukee, Wis. Illustrations covering other mechanical features of Seal-Clad motors in ratings up to 25 hp., 1,800 r.p.m. are also contained in this leaflet.

Ray P. Tarbell was recently appointed manager of the welding division of The Ideal Electric & Manufacturing Co., of Mansfield, Ohio. Mr. Tarbell has been in the welding industry since 1918.

Link-Belt Company, Chicago, Ill., has issued a 32-page illustrated catalog No. 1415, covering single, double and triple reduction units of herringbone gear type, also a full line of flexible couplings. Catalog also contains horse-power and other engineering data, dimensions, diagrams, etc.

General Electric Company, Schenectady, N. Y., has published bulletin GEA-1644C covering soil heating equipment, soil sterilizing equipment and floodlighting for gardens, roadside stands and market places. The bulletin contains information on installation and operating costs, and lighting layouts for greenhouses.

The Graybar Electric Company has opened a new wholesale house in Phoenix, Ariz., which makes the seventy-sixth in its chain of wholesale distributing centers.

April New Products

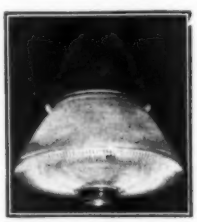
Outdoor Siren

A weatherproof siren Fedelcode No. 1 is announced by Federal Electric Co., Chicago, Ill., for use by small towns, villages and industrial plants in sounding fire

alarms, police alarms, etc. Designed to operate on 110-volt a.c. or d.c. circuits, this device is equipped with a one-h.p. vertical type ball bearing motor which is claimed to accelerate from zero to over 5000 r.p.m. in three seconds. All parts are made of special cast aluminum alloy, the housing being finished in red Duco enamel.

Industrial Lighting Unit

A vapor-proof lighting unit has been designed by the Holophane Co., New York, N. Y., for chemical plants or other industries in which excessive dust accumulation and fumes make cleaning difficult. This No. 02368 unit is of smooth glass on



both inside and outside surfaces for ease of maintenance. The distribution curve ranges between 40 and 55 deg. to fit the majority of conditions requiring effective yet glareless light distribution. The holder is designed to exclude the corrosive fumes or excessive moisture encountered in chemical plants, distilleries, breweries, etc.

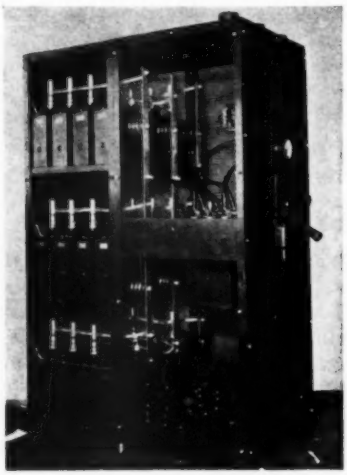
Solderless Connector

A universal solderless connector for splicing solid and stranded conductors in

cramped spaces within outlet boxes, fixture canopies, signs, etc., has been announced by the Ideal Commutator Dresser Co., Sycamore, Ill. This No. 73 connector is claimed to screw on like a nut on a bolt, and to provide a strong mechanical joint with good electrical contact. Although the design has permitted a reduction in size, common wiring joints can be made for two No. 14; two No. 14 and two No. 18, solid or stranded conductors, up to four No. 16s or five No. 18s.

Capacitor Unit

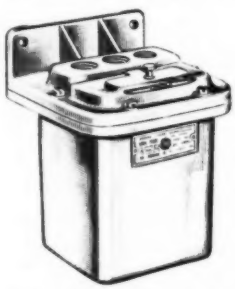
A line of hermetically sealed power capacitors about half the size and a third the weight of conventional oil filled units is announced by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. The individual units are impregnated with a fire-proof impregnating



medium called inerteen, are housed in welded cases of .05 sheet steel, and equipped with rugged solder seal porcelain terminal bushings. The compact individual units are assembled in newly designed welded racks, frames, or cabinets for any sort of mounting including pole mounting. These capacitors are available from 5 kva at 230 volts up to 1200 kva at 6900 volts. A 240 kva unit is shown, complete with breaker, with screens removed.

Switch Enclosures

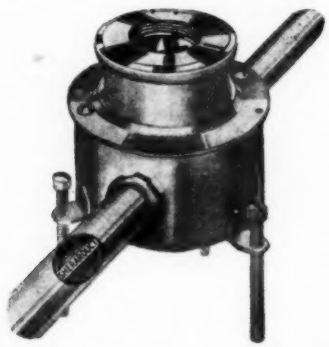
A line of enclosures has been announced by the Allen-Bradley Co., Milwaukee, Wis., for bulletin 709 solenoid-operated across-



the-line switches to take care of polyphase motors up to 15 h.p., 110 volts; 30 h.p., 220 volts; and 50 h.p., 440-550 volts. Type G enclosures are explosion-proof, of black enameled cast iron, for Class I, Group D, hazardous locations such as dry cleaning establishments, gasoline filling stations, etc. Type H enclosures are oil-immersed explosion-proof, with cast iron, black enameled hoods and tanks, and have a machined-surface seal between tank and hood, for use in chemical plants or other corrosive gas or vapor conditions. Type J non-explosion-proof, oil-immersed type enclosures, are available for providing protection of contacts against corrosive gases. The type H hood is tapped to receive conduit, while both type H and J hoods and tanks are cadmium-plated as a protection against corrosion.

Floor Box

A Sherardized floor box announced by the National Electric Products Corporation,



Pittsburgh, Penna. permits the installation of a rigid conduit type under floor distribution system, claimed to be free of corrosion, water and moisture. A modern line of rubber and brass top service fittings is available for use in connection with this floor box. The simplicity of adjustment and levelling of outlet boxes upon rough concrete floor surfaces is featured. Three tapped lags equipped with adjusting screws are provided for this purpose on the sides near the bottom of each box. A metal gasket has been developed for this box which is claimed to be water and moisture proof, free of deterioration, and made more efficient every time the box is opened or closed. Ease of access for servicing and convenience is aided through the use of a self-contained gasket. Every surface, edge and crevice of the box is sherardized to protect against corrosion, while parts exposed after installation are of finished brass.

Solderless Lug

A line of solderless lugs is announced by Ilsco Copper Tube and Products, Inc., Cincinnati, O., which features simplicity. A triangular clamping arrangement by which stranded wires are forced into a solid

mesh; vise-like grip; a wide range of solid and stranded wire sizes; freedom from set-screw contact with wire and ease of quick attachment by means of screw driver, wrench or pliers are featured claims.

The Day-Brite Reflector Co., St. Louis, Mo., has announced its new bulletin "K" covering the "Super-Lume" line of all-steel porcelain enameled industrial reflectors.

The Peerless Electric Company, Warren, Ohio, announces that A. D. Walter, formerly with the Ohio Electric & Manufacturing Company, Cleveland, Ohio, has become associated with its organization and will have his headquarters in Warren.

Wilson Lighting, Inc., manufacturer of lighting equipment, announces the removal of its factory and offices from 2336 North Hayne Ave., Chicago, Ill., to 13 South Clinton St., Chicago.

The Congress Tool & Die Company, Inc., Detroit, Mich., has just published its catalog dated November 15, 1934, covering standardized drives, which includes couplings, step cone, crown face, round belt, "A" V type pulleys and "B" V type pulleys. The catalog contains full engineering data pertaining to the Congress line of drives.

The Belden Manufacturing Company, Chicago, Ill., has opened a warehouse in the New Terminal Commerce Building, 401 N. Broad Street, Philadelphia, Pa., from which point the eastern market is to be served. A complete stock of Belden Magnet wire and a new soft rubber plug assembly division are combined at this new branch, which is in charge of E. V. Blake, who was recently promoted to Eastern Manager.

A 21-page illustrated book of engineering data designed to simplify the selection of belting, hose and other mechanical rubber goods, has been compiled by the B. F. Goodrich Company, mechanical division, Akron, Ohio. A section of this book is devoted to a discussion of the relative merits of rubber and leather belting together with tables and diagrams on rubber transmission belting.

Classified Advertising

For Sale: At a sacrifice. Only Electric Shop in Calumet, Michigan; population 20,000; established 1918. Write to John Wickstrom, Laurium, Michigan.

Advertisers' Index

SQUARE D SWITCHES FOR WATER HEATERS

■ Every indication points to a banner year for domestic electric water heaters. The power companies are driving ahead with active sales campaigns for water heater service. It will be profitable for you, if you use Square D disconnect switches.

■

The new Square D Swing-out Interior Switch is just what you want for these jobs — the swing-out feature will cut the wiring time in half—save you money—give you more time in which to do more jobs.

■

Or, if your power companies have standardized on special switches for water heater disconnect, Square D can supply them. Two of these special switches are here illustrated —one, a dual switch for controlling two-element heaters or for operating the heater on off-peak with supplementary service from the general service meter; the other, an accessible main fuse switch for separate off-peak water heater service.

■

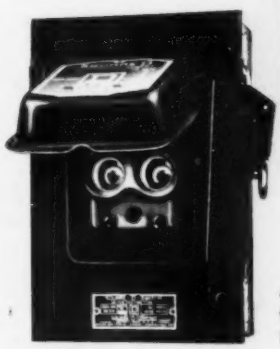
Whether your power companies have a flat rate or an off-peak rate for water heaters, Square D makes a switch to meet the requirements. Also a complete line of range and lighting combinations with special provisions for water heater connections. (Reference Cat. No. 39582-K.)

■

Now is the time to act. See your Square D distributor.

The new Square D switch with the swing-out interior. Isn't that an easy wiring job?

A dual combination switch for two-element water heater.



An accessible main fuse switch for separate off-peak hot water heater service.

SQUARE D COMPANY

DETROIT MICHIGAN U.S.A. MILWAUKEE WISCONSIN

SQUARE D COMPANY, INC., LOS ANGELES, CALIFORNIA
SQUARE D COMPANY CANADA LTD. TORONTO, ONTARIO

SQUARE D
SQUARE D COMPANY
ELECTRICAL EQUIPMENT

TURN POTENTIAL BUSINESS INTO PROFITABLE BUSINESS

Three Steps to Greater Profits

How much electrical modernization business did you do last year? Examine your books and find out exactly. You will be astounded by its small total in proportion to the potential business available. Now is the time to increase that proportion . . . make that potential business pay you profits. Here are the three essential things to do.

1. Cover the market — Every home must be called upon systematically, street by street. Supplement this activity by direct mail.
2. Prove to home owners that money is available — Explain the Government's FHA Program to them and tell them how they can obtain money for such work.
3. Use General Electric Wiring Materials exclusively—They meet every requirement of safety, economy durability . . . guarantee maximum electrical comfort and convenience in every home.

With General Electric Wiring Materials, you cover all markets. G-E "Safecote" Building Wire; G-E Conduit Products; G-E Wiring devices . . . all are made and guaranteed by the one company. They are safe, reliable, easy and economical to install. They are known to everyone as products of outstanding quality. For complete information and FHA Booklet, write Section CDW-484, Merchandise Department, General Electric Company, Bridgeport, Connecticut.

★ ★ ★ ★ ★

Listen to the General Electric Radio Program, dedicated to the American Home, every Sunday at 12:15 P. M. (E.S.T.) on the nation-wide NBC Red Network.

GENERAL ELECTRIC

WIRING MATERIALS

MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONNECTICUT